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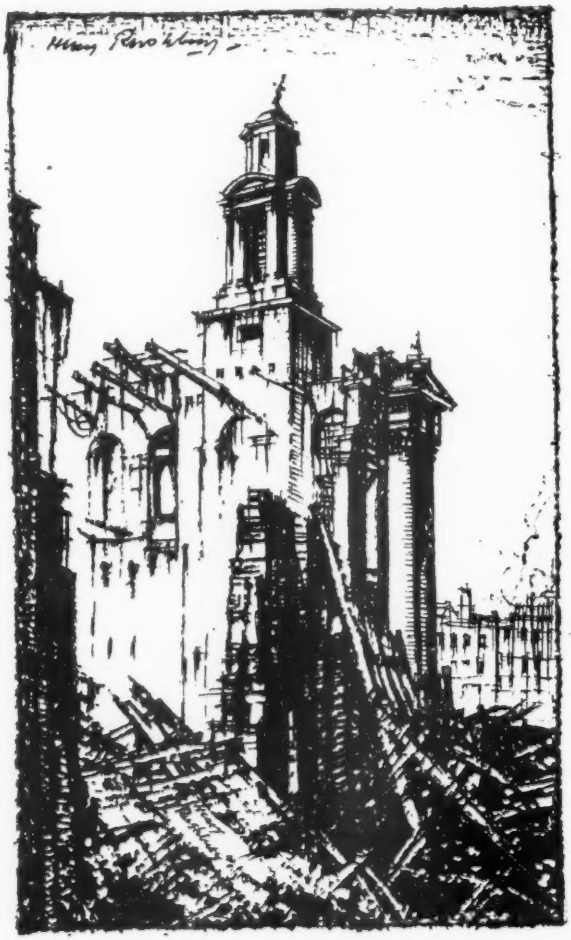

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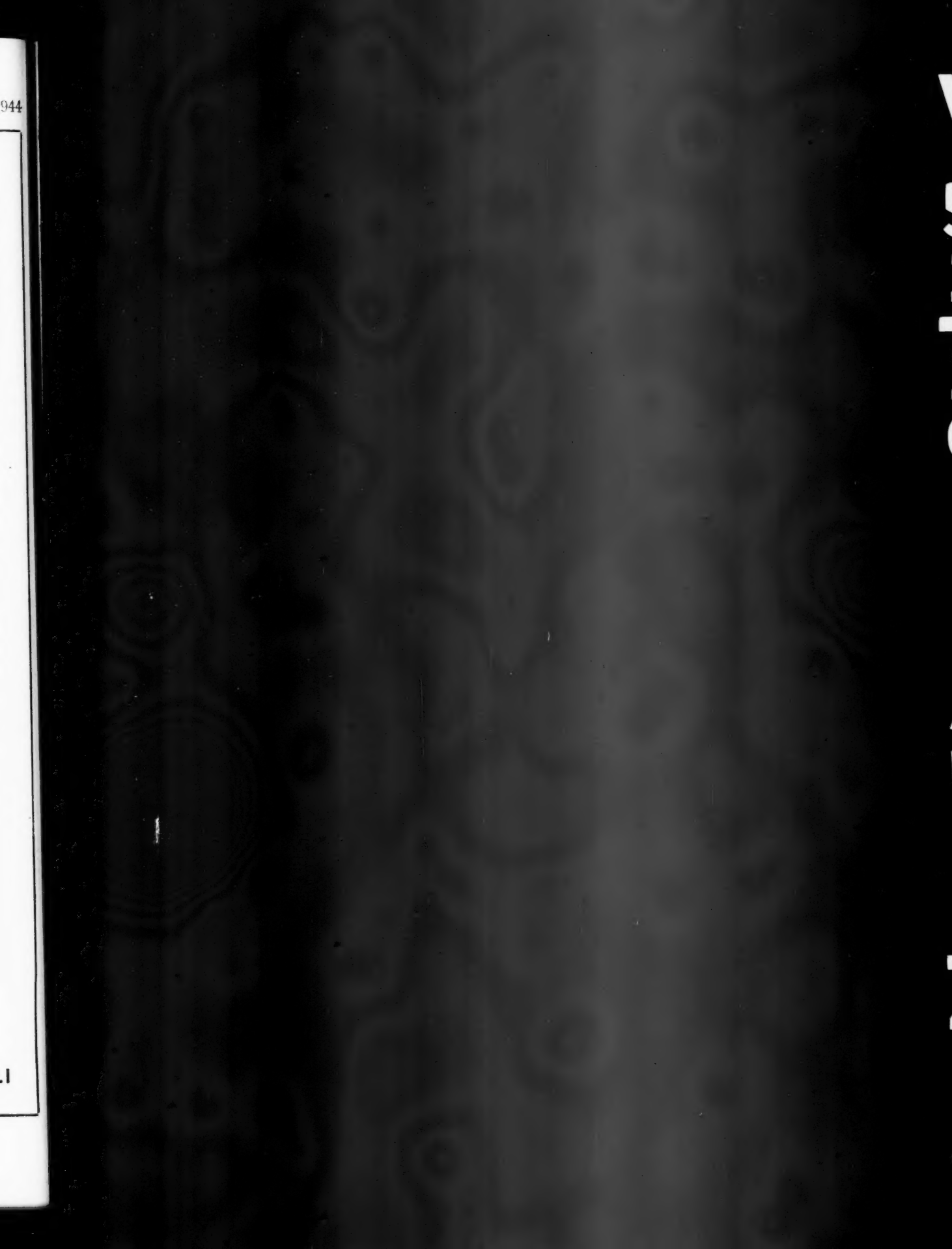

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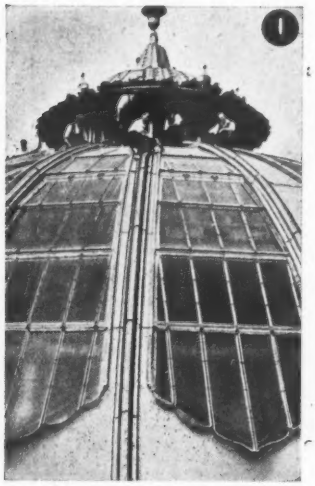

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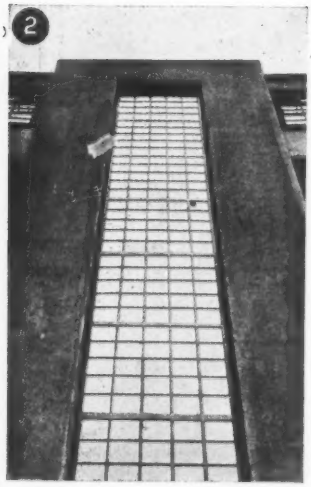

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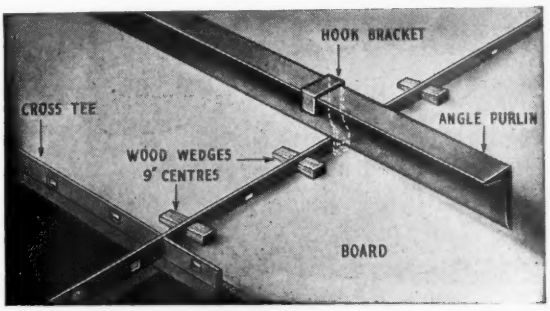

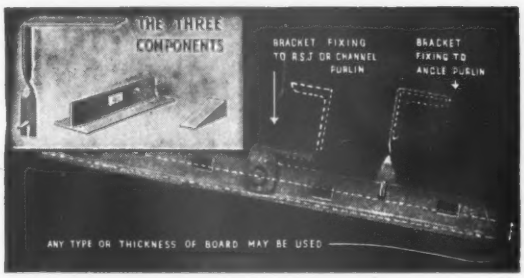
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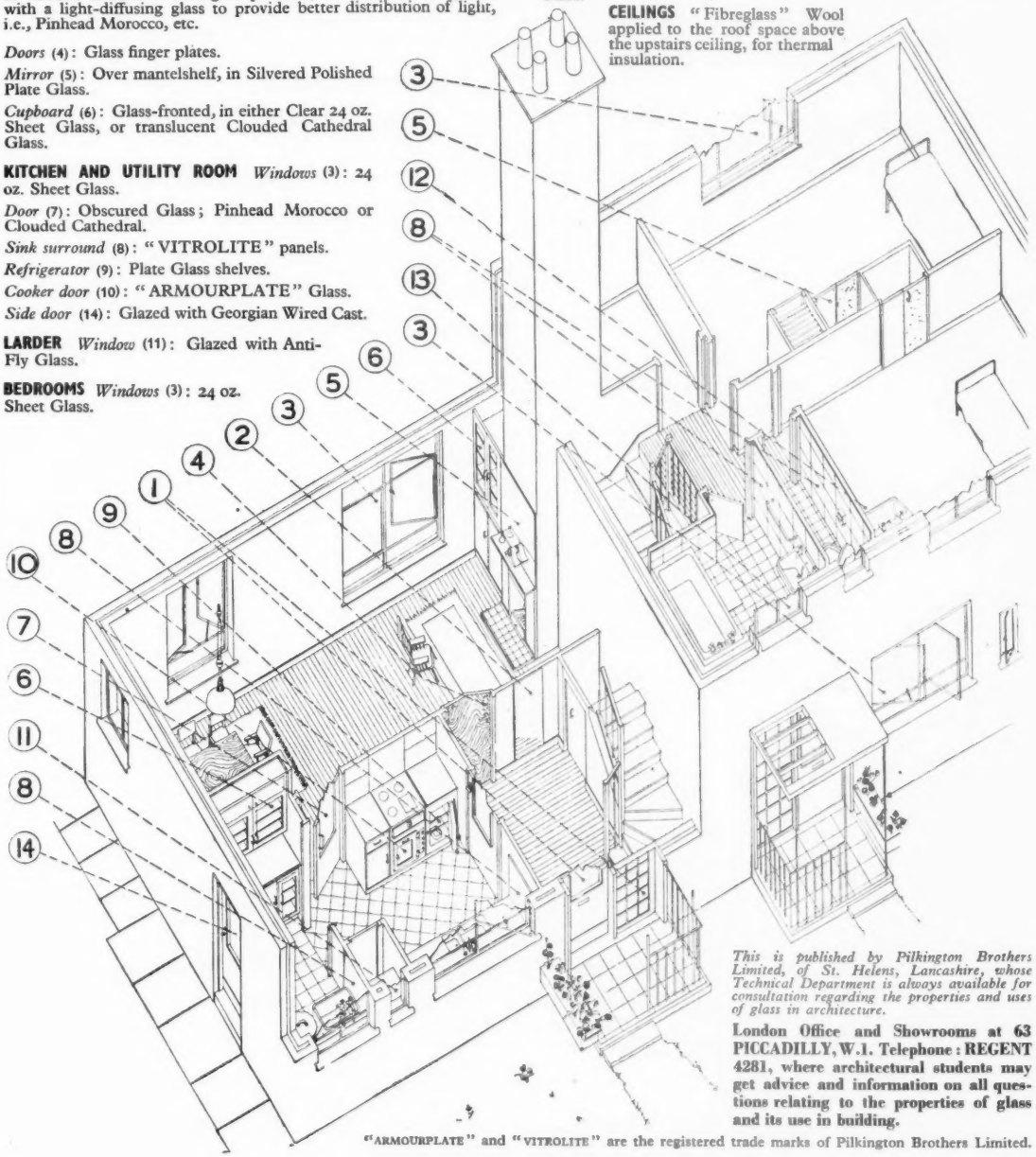

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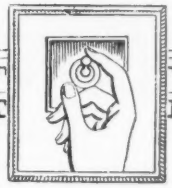

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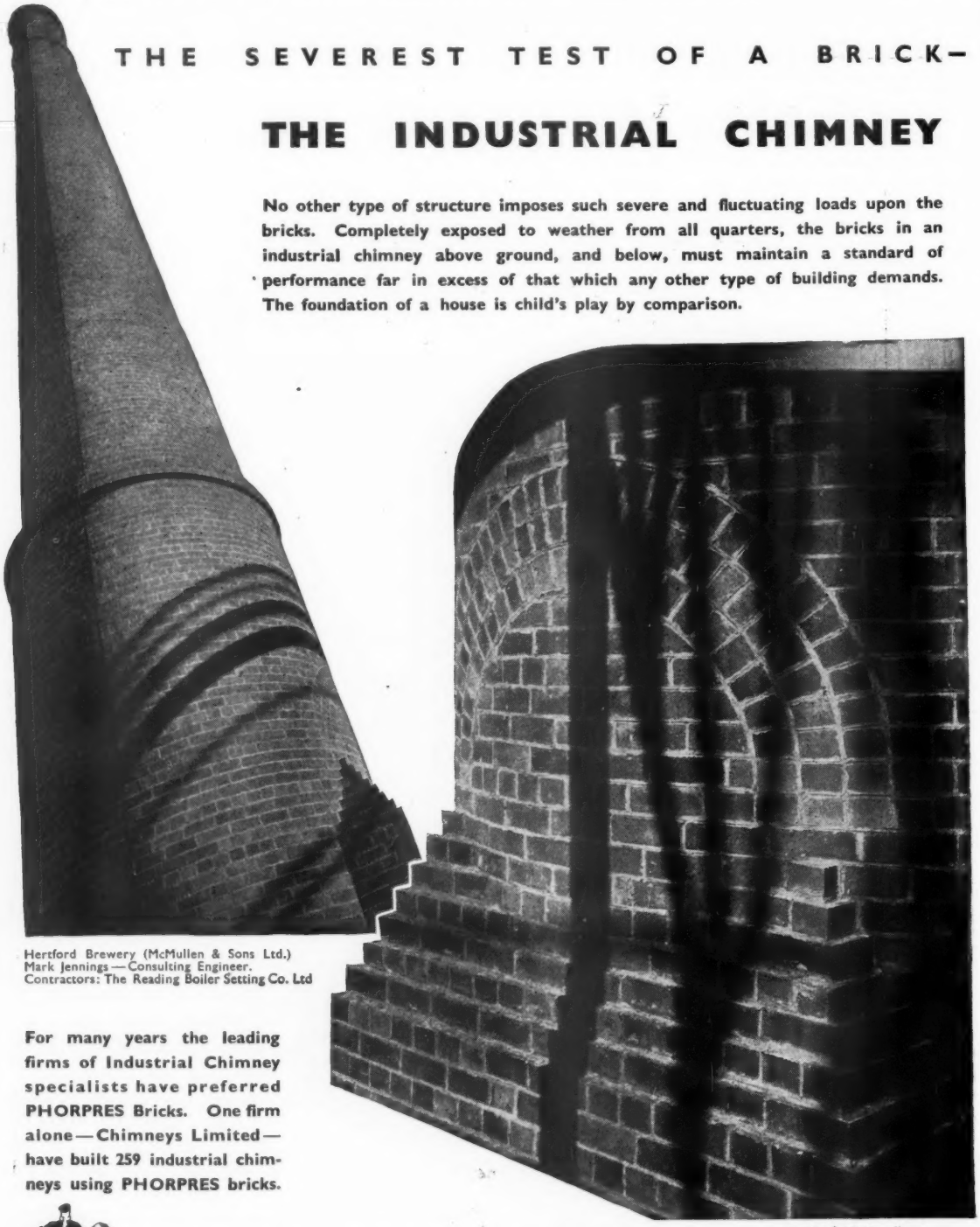

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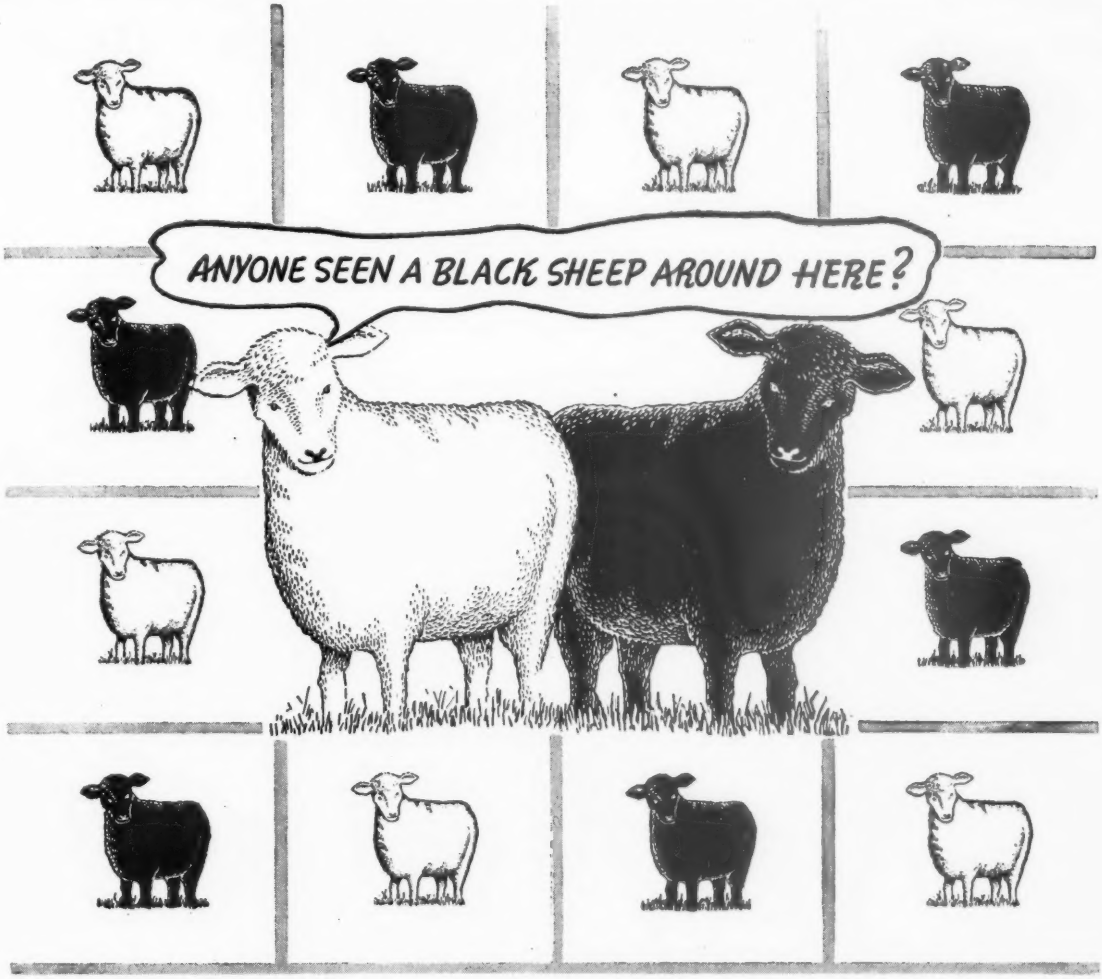

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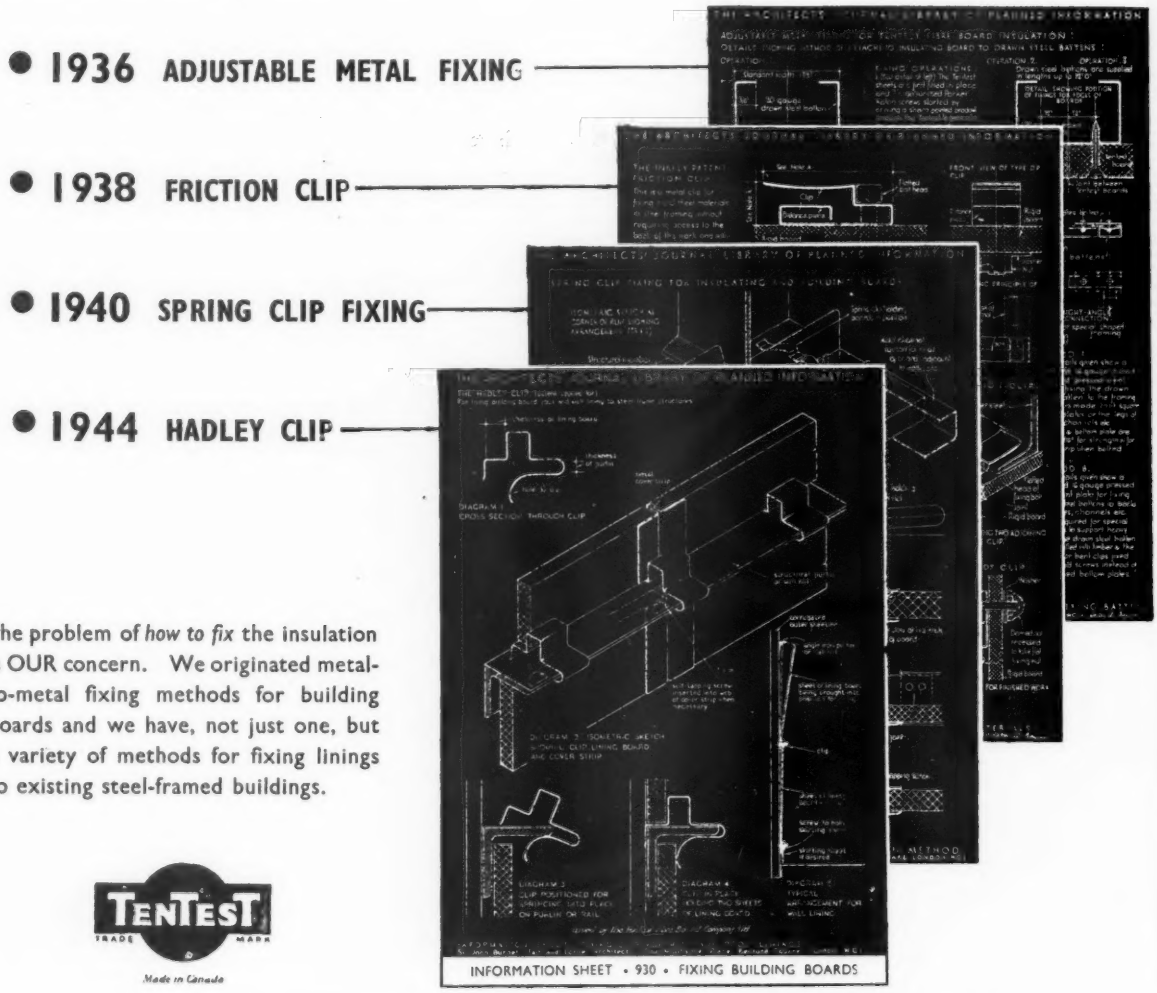
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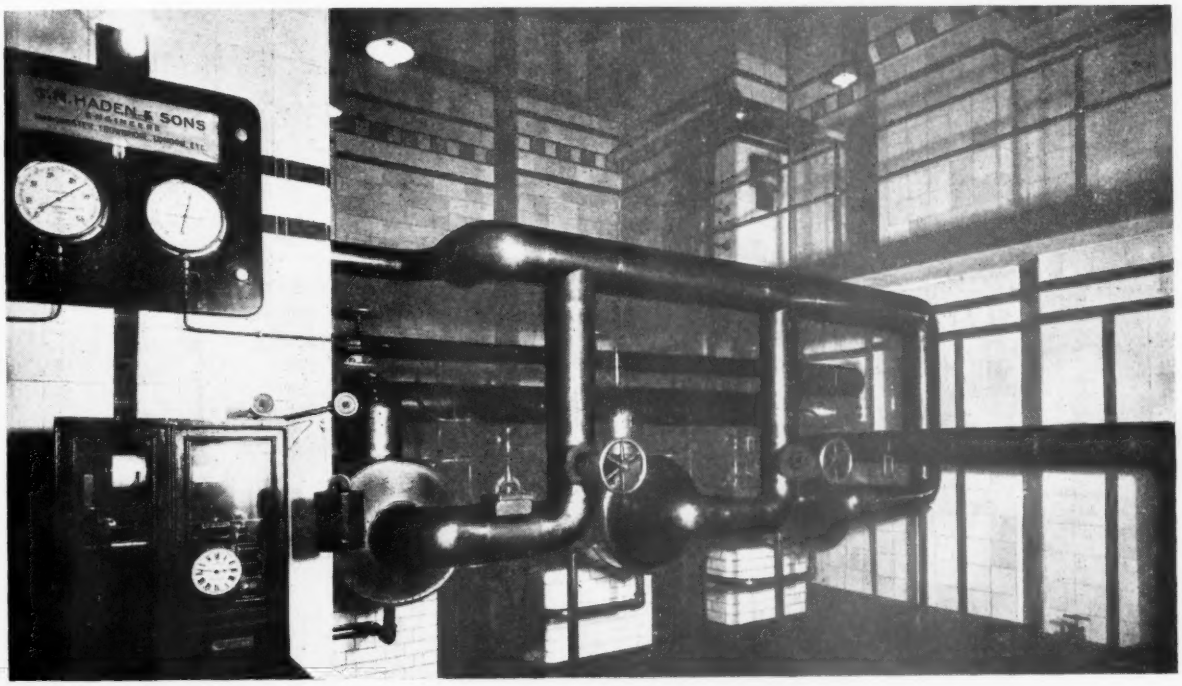

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The prospect of St. Paul's from the North East, 1730, by T. Bowles.

JOURNAL OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS

3rd Series **No. 10]** AUGUST 1944 **[*Vol.* 51**

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Journal

EXHIBITION OF CONTEMPORARY BRITISH ARCHITECTURE

Owing to recent developments it has been decided to postpone this Exhibition.

Entry forms already received will be retained and the senders notified in due course of the revised date of the Exhibition.

R.I.B.A. INFORMAL MEETINGS, 1944-5

The following Informal Meetings have been arranged to take place on the following dates during the Session, 1944-45 :

1944 :

Tuesday, 14 November. **The National Plan,** by Mr. A. W. Kenyon [*F.*], Chairman of the R.I.B.A. Central Planning Advisory Committee.

Tuesday, 12 December. **The Architect and Organisation of Post-War Building,** by Mr. T. P. Bennett, C.B.E. [*F.*].

1945 :

Tuesday, 16 January. **Post-War Housing,** by Mr. L. H. Keay, O.B.E. [*F.*].

,, 13 February. **The Work of the late Sir Edwin Lutyens,** by Mr. H. S. Goodhart-Rendel (Past-President).

,, 10 April. **The Work of the Codes of Practice Committees,** by Mr. C. Roland Woods, M.B.E.

,, 19 June. **Post-War Architectural Education,** by Professor L. B. Budden, M.A. [*F.*]

The Annual General Meeting will be held on 1 May, 1945, at 6 p.m.

American and British Housing Discussions

On Wednesdays during the American Housing Exhibition four discussion meetings are being held when the character of the exhibition as a thought-provoking affair can be displayed and extended.

At the time of going to press with this number two thoroughly successful meetings have been held on prefabrication and on the mass housing problem under the title "Housing half-a-million families." At each we have had British and American openings and good British-American audiences, so that the implied subtitle "American experience and the British problem" has been fulfilled by the character of the discussions.

On 26 July Mr. Rudolf Mock and Mr. Gwyn H. Morris, senior housing architect of Coventry, with Mr. A. C. Bossom, M.P., as chairman, talked about prefabrication. Mr. Mock, who was a Swiss architect and is now an American, described American prefabrication experience. They had first experimented with steel, but now had come almost exclusively to the use of wood which they were learning to use with a high degree of scientific accuracy. Their aim was not merely to provide stop-gap housing with the aid of prefabrication but to turn out a better house than could be made by traditional methods. They had not got so far yet: much of their work was paniky and emergency and bore the signs, but there was constant and lively experiment and big things were possible in the future.

Mr. Morris described the Coventry design for a prefabricated house which he illustrated by large photographs of the model. As a contrast with the all-timber buildings described by Mr. Mock, this house made use of many and various materials, steel for the frame, concrete blocks for the ground-floor infilling, reeded-asbestos above, zinc or copper for the roof. This it seemed was more likely to be the manner of British prefabrication development than one material design. Mr. Morris emphasised some of the social and economic advantages of prefabrication. The trade unions should, he thought, support the use of prefabrication which could help to do away with the old building trade curse of bad weather stoppages. Also it was possible to provide good working conditions all the year round in factories.

There was a long and lively discussion on the size of windows, the exclusion of damp and noise—and rats, the permanency of prefabrication, the merits of various modules—the U.S. standard was 4 ft. but others had been used.

The meeting on 2 August was on the housing problem in general terms. The chairman was Prof. W. G. Holford and the speakers Major Henry P. Cain, Mayor of Tacoma, State of Washington, Mr. Charles Hogan, who had been in the U.S. Housing Authority, Miss Elizabeth Denby, and Mr. Bertram Parkes, Architect to the Bournville Village Trust.

With four speakers, all with plenty to say in a brilliantly lively way, there was not much time for discussion, but no one would willingly have missed the superbly wide panorama of housing problems and solutions which was painted by all four. Major Cain started by describing the housing problem as essentially a political problem; he was a politician and looked at it that way. He described the organisation of the American housing agencies, particularly the U.S.H.A., which guaranteed loans for local authority housing and was the agency which catered most successfully for low-income housing. Major Cain spoke in an urgent and moving way of the vastness of the American housing obligations and the quality of the solutions which had to be found.

Mr. Hogan said that he was deputising for Corporal Sam Rytinsky, an American architect from U.S.H.A., who had been billed to speak. There were no technical obstacles in the way of building 500,000 dwellings. Their problem was to make the 500,000 homes of a really high standard in planning and design. They thought too much of land values and, under a system largely of benevolent paternalism, or what seemed to be that, there was constant pressure down to minimum standards. Mr. Hogan then touched on the various problems of design and standards which lay at the root of the American housing problem and spoke at some length on the community and social problems of mass housing both in new towns such as had been created by the war and in the rehousing in the centres of large cities.

Miss Denby and Mr. Parkes next made their English contribution. Both dealt in some detail with the use in Britain of temporary and prefabricated houses. There was a certain amount of attack and defence of the Portal house and discussion on the problems of its siting. The main theme, emphasised by all speakers was that mass-produced housing and the use of advanced structural techniques without regard for the maintenance of high standards of design, accommodation, equipment and social amenities would be disastrous.

Before the next JOURNAL is published the last two discussions on community planning and the problems of post-war housing in Europe will have been held and the Exhibition itself will have come to an end after six successful weeks at the R.I.B.A. The Exhibition is to go on tour; first in London to the Whitechapel Art Gallery and then possibly to Leeds and Leicester.

Presentation to Sir Ian MacAlister

The presentation to Sir Ian MacAlister, which had to be postponed owing to his accident early this year, has now been fixed for 2.15 p.m. on October 18, 1944, at the R.I.B.A.

War Damage Act 1943, Part 2

Architects' Fees in Connection with the Repair of War Damage under Part 2 of the Act.

The distinction between a claim under Part 1 of the Act and one under Part 2 of the Act is that the former relates to the right of a claimant to be reimbursed the proper cost of executing work in the repair of War Damage to buildings including the cost of the necessary employment of a qualified person in an advisory or supervisory capacity, whilst the latter refers to indemnity against proved loss to chattels through War Damage, only in certain conditions, namely :—

Architects' fees under Part 2 of the Act are therefore recoverable

1. In claims arising before 17 April 1941 (the date the Act came into force) fees are allowed where they were incurred in the original cost of design, construction or installation. If such fees were not incurred they are not allowed.
2. The sum insured under the Act can, with the approval of the Board of Trade, include professional fees for reinstatement and these would, if actually and properly incurred, be paid in any claim arising after 17 April 1941, to the extent of the amount covered.
3. In other cases due consideration will be accorded by the Board of Trade to any claim which has special circumstances.

Members should therefore advise their clients to include Architects' fees in insurances effected under Part 2 of the Act, and also, before accepting instructions in such matters, they should point out the risk of the claim for fees being questioned or rejected on the ground that the employment of an architect in the circumstances was not really necessary, in which case the client would find himself liable for such fees.

Architectural Association School of Architecture

The Council of the Architectural Association announces that Mr. Frederick Gibberd [*F.*], A.M.T.P.I., has resigned his post as Principal of the A.A. School of Architecture, in which he has rendered particularly valuable service during a difficult period.

R.I.B.A. Library Closing

The library will be closed for all but essential war enquiries during the week Monday, September 4 to Saturday, September 9. This is to enable arrears of work and the annual cleaning to be completed.

The loan of Books due for return during the week when the library is closed will automatically be extended until Monday, September 11. Current issues of periodicals will be available on the 1st floor landing.

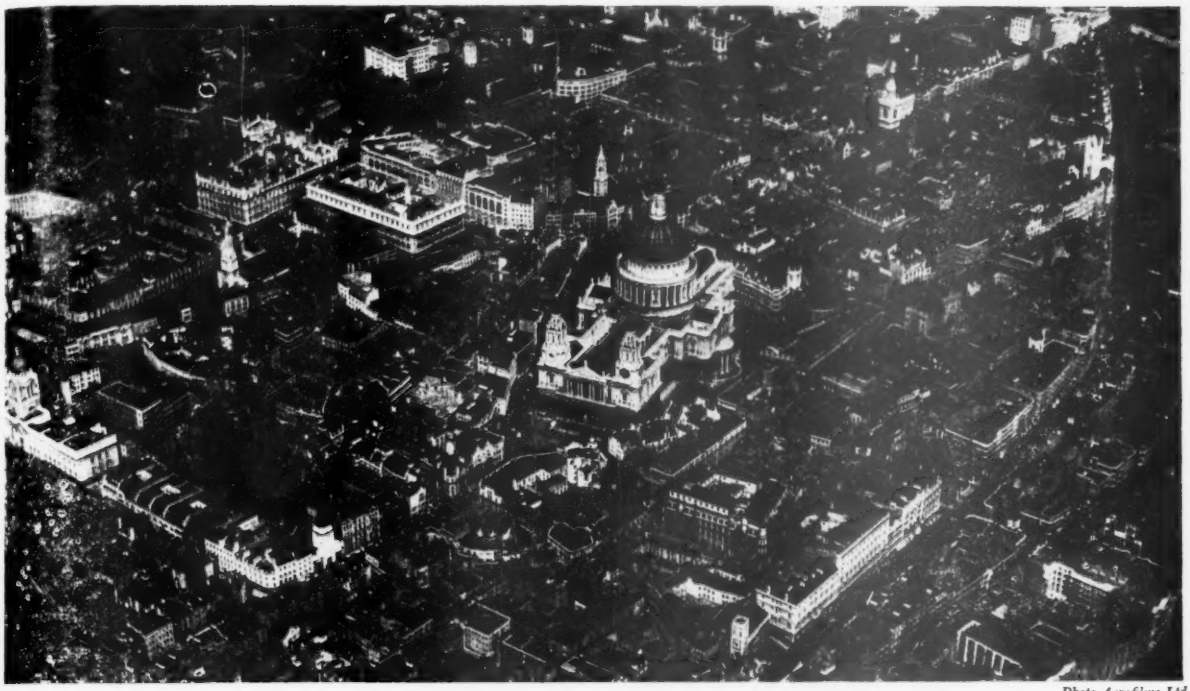


Photo Aerofilms Ltd.

THE SURROUNDINGS OF ST. PAUL'S, AND A NATIONAL MEMORIAL

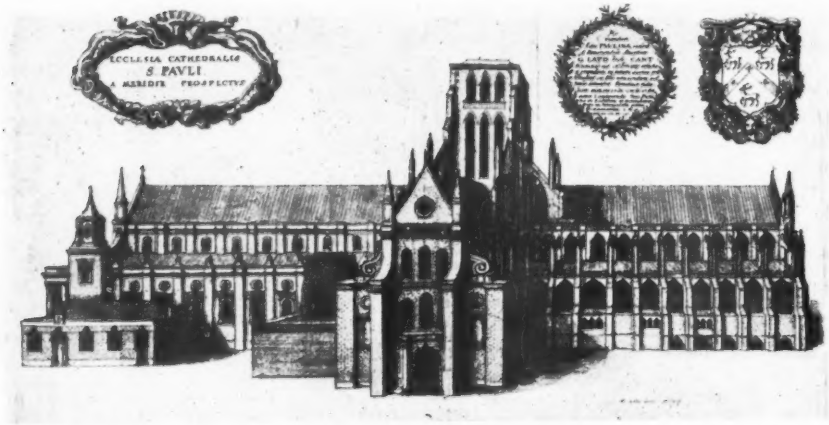
A paper read to the Ecclesiological Society by W. H. Ansell [*F.*], Past-President.

I would like at the outset to make my own position clear. Many of you have doubtless come expecting and hoping to hear Mr. Godfrey Allen, whose name is on your programme for the lecture this afternoon. I sympathise with your disappointment and regrets, indeed I share them, and I hope that his talk is not abandoned, but merely postponed. When, owing mainly to illness and stress of work, he was unable to give the lecture, he asked me if I would take over his text and preach my own sermon upon it. A dictated text, I find, has its difficulties and I can now realise to some extent the feelings of those clergymen who, in accordance with the subtly ironical bequest of a pious testator, in yearly turn preach before one of our Inns of Court on the first words of the 25th verse of the 10th chapter of St. Luke.

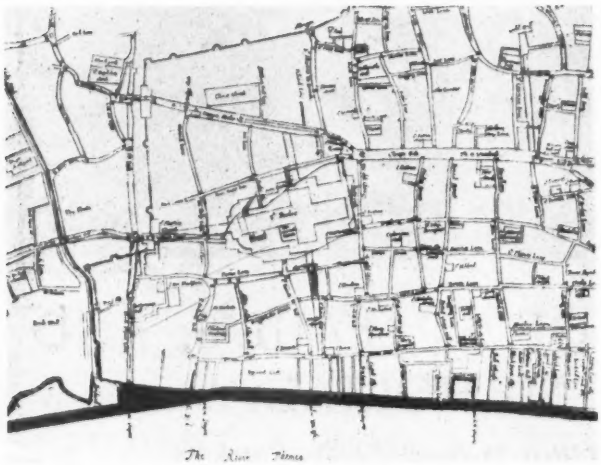
Mr. Allen, therefore, must not be held in any way responsible for the opinions I express, even though his help has been freely given on matters of history and of fact, and in the loan of slides.

The title of my lecture is divided into two parts. I propose, therefore, to deal with the subject in the same way. It may help us if we first remind ourselves of the general character of the precincts of Old St. Paul's immediately before the fire of 1666. The many readers of Stow and Dugdale, and of those later writers who have found their works such a mine of information, will remember that there was formerly no great thoroughfare running from East to West past the Cathedral, such as now exists in Cannon Street. Between St. Paul's and the river were three ways, all narrow by modern standards, Carter Lane, Knightrider Street, and Thames Street ; most of the traffic would go by Cheapside or Thames Street as its East and West ends were more direct and open than the somewhat labyrinthine extremities of the other streets. The Churchyard itself was enclosed by a wall approached through gates which were not done away with even at the time of the rebuilding of the new Cathedral. Old St. Paul's certainly had a Cathedral close ! The wall enclosed practically the whole of the Churchyard up to Paternoster Row and Ave Maria Lane, down to Carter Lane on the South and Old Change on the East. The close had six gates, one the Western Gate in Bowyer Row, which was the upper part of Ludgate Hill, one at Paul's Alley, one at Canons Alley, then the Little Gate out to Cheapside, which had an archway and a three-gabled room above, there was another gate by St. Augustine's at the end of Watling Street, and finally the way out to the South and the river by Paul's Chain and Paul's Wharf Hill.

Stow (1633) records how as early as 1107 " Bishop Richard Beaumor began to compass the churchyard with a strong wall of stone and gates," and Henry I gave him material for this purpose from the wall of the castle on the Thames side. It does not appear that the wall entirely enclosed the Cathedral at that time, or if it did it must have been inadequate, for at a later date, which some give as 1285, and Stow 1317, the wall, by reason of " the Murthers and Robberies that were there committed," was raised and gates were fitted, and in 1344, Edward III " gave commandment for the finishing of that wall which was then performed and to this day it continueth, although now on both the sides (to wit within and without) it be hidden with dwelling houses." The history of the precincts of Old St. Paul's is one long melancholy story of the destruction of interesting, beautiful



Wenseslaus Hollar's view of St. Paul's from Dugdale's History of St. Paul's Cathedral, 1685



Part of John Leake's "exact Surveigh" of the fire area, 1666, showing an enclosure round old St. Paul's and certain alterations in the street plan

ecclesiastical buildings on the one hand, and of civil encroachments on the other. The great and high Clochier containing the Jesus bells was pulled down by Sir Miles Partridge in Henry VIII's time. The great Cloister adjoining the church on the North enclosing the Pardon Haugh Churchyard Eastward of the Bishop's Palace, had a "faire Chapell" founded by Gilbert à Becket, and on the East side of the Gloister was a library. That cloister and the Chapel "excepting only that side where the library was," says Dugdale, were destroyed by the Duke of Somerset in 1549, the ground being converted afterwards into the garden of the Petty Canons, the stone being used in the building of the earlier Somerset House. The library was destroyed in the fire of London. The Charnell House and the Chapel over it, which stood near Paul's Cross, were also pulled down in 1549, and in 1658 Dugdale says that a stationer's house and shop, with the sign of the Rose, is "in that very place."

On the South side, the two-storeyed Cloister and the Chapter House, some of the foundations of which can still be seen, were still standing, though without the high roof, when Hollar made his drawings in 1655 or so. They, however, were, even in Stow's time, twenty years earlier, "defaced by means of licenses granted to Cutlers, Budget-makers and other, first to build low sheds, but now high houses, which doe hide that beautifull side of the Church save only the toppe and South gate."

The Bishop's Palace on the North West had fallen from its high estate "since the rebatement of Bishops Livings," and no longer lodged kings or kept great household. But little, indeed, can have been left at this date.

The Dean's Lodging still stood, and the old Prebendaries' and Residenciaries' houses were now either decayed or otherwise converted.

St. Paul's School was at the East side of the Churchyard, the Brewhouse and the Bakehouse on the South. The desecration of the Cathedral had been carried to an extraordinary extent, difficult to realise or understand. The public thoroughfare through the transepts, even animals being led through, the secularisation of Paul's Walk, only the choir apparently being still used for worship, were some of the evidences of this. Inigo Jones's portico had been built at the West end. Its fine proportions and its novelty in England caused it to be greeted with rather exaggerated praise. The spire had never been rebuilt after the fire of 1561, and parts of the church were in sad disrepair, so much so that shortly before the great fire of 1666 they came tumbling down about the ears of those who were repairing them.

And all about, lining the walls of the close both inside and out, crowding the inner areas, were the houses and shops of the citizens. Up to the fire, encroachment by the citizens of London on land which did not belong to them appears to have been generally practised. When a man wished to rebuild his house, he first masked his old line by piles of building material, and then moved it forward as much as he dared. If he had influence he managed to get the encroachment licensed by the City. When it was impossible to extend on the ground floor he encroached in the upper stories which projected so far that they almost met those of his opposite neighbour. Churches allowed themselves to be almost surrounded by shops and houses, a practice not unknown even after the fire, as the shop leaning against St. Stephens Walbrook and the offices blocking the windows of St. Nicholas Cole Abbey, clearly prove. There does not appear to have been much extension upwards. Stow quotes the awful example of the Merchant Taylor who "builded a fair house with an high tower the first of timber that ever I learned to have been builded to overlook Neighbours in this Citie." He got the gout so badly that "he could go no further than he was led—much less was he able to climbe and take the pleasure of the heighth of his tower." An obvious warning to all builders of skyscrapers.

Then, in September, 1666, came the fire, destroying 13,200 houses, 44 Halls of City Companies, St. Paul's Cathedral, and 87 parish churches, Guildhall, Royal Exchange, Custom House, and many riverside and City buildings, thus providing the London of that day with a far more colossal building task in proportion to its size and wealth than is the present emergency for the London of to-day, and the building industry of to-day.

To epitomise what I have said, the surroundings of St. Paul's before the fire of 1666 consisted of a walled-in close, with gates through which access was free but not altogether easy. The boundary line of the close was haphazard and far from orderly.

South-East view by P. Fourdrinier, 1743

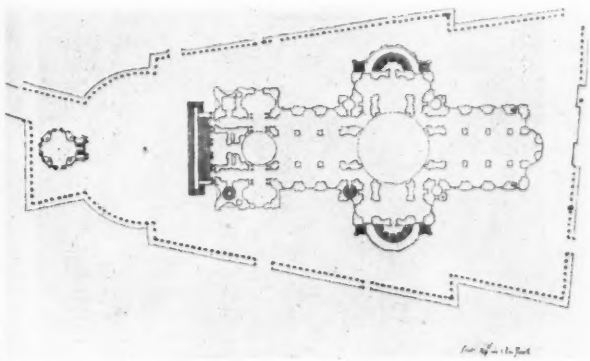
It appeared to have only the slightest relationship to the form and plan shape of the Cathedral. Although St. Paul's was no separated, jealously guarded precinct, there was no main traffic way round the church—there was much encroachment by civil building—the folkmote area at the East end of the Churchyard was claimed by the citizens, as well as the right for armed bands to parade at the West end.

Old St. Paul's was the everyday friend of the citizens of London, even though it must be admitted that they treated it with the contempt which over-familiarity is apt to breed, and that they showed an astonishing disregard of its beauty and value. Old St. Paul's Churchyard, with its " Murthers and Robberies," its untidyness, its lack of order, its turbulence and surging life, were in some degree a stronghold of mediævalism. The plague and the fire were a shattering attack on more than houses and buildings, they continued the change which the Renaissance had already begun. Not only did a new city arise, but a new mode of life, a new approach to the art of living.

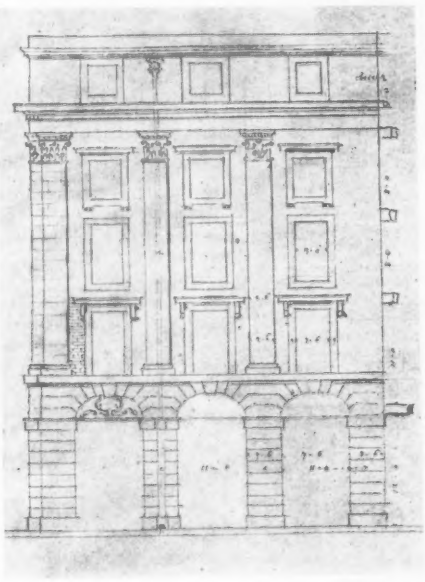
It is interesting to note that in one of John Leakes' maps of the ruins, first made in six parts in December, 1666, and afterwards " reduced to one intire platt," there is shown round Old St. Paul's a line suggesting an enclosure which gave to the Churchyard a certain orderliness and, in its boundaries, a relationship to the Cathedral ; the line of Ludgate Hill is altered, a broad street is shown from Newgate opposite the North transept, and another from Thames Street, opposite the South transept. Curved boundaries are suggested each side of Inigo Jones's Portico. Some of these have been incorporated into the schemes of modern planners, and I find it difficult to avoid the suspicion that they were added to the map some time subsequent to its making. The fact that they are related to the plan of Old St. Paul's and not the new Cathedral gives little support to that theory, however, but as they do not appear on some reproductions, they must remain under suspicion.

The new Cathedral took over thirty years to build. The encircling buildings were finished and even past their first youth before St. Paul's was opened.

Wren's plan shows two great avenues converging at St. Paul's, which would stand in no enclosed space, but between the two wide thoroughfares, with a broad place at the West end. As you know, the plan was not carried out, and Wren himself produced a plan for an enclosing piazza surround to the Cathedral. This shows no main traffic way through the Churchyard. There is an exit to Ludgate, and at the North East end to Cheapside. There are no axial vistas of the transepts, nor of the East end and a circular building—Chapterhouse or Baptistery—is shown opposite the West front. The Piazza buildings were to be 54 feet high, with four floors above the ground floor. While there need be no great regrets that this scheme was not carried out, it is interesting in that it admits the possibility of the enclosed area. It is certain that the Churchyard boundaries were now



Above : Wren plan for St. Paul's Churchyard as a Piazza. From a drawing in Sir John Soane's Museum



To Right : Detail of the proposed Piazza and Arcade. Part of a drawing in the St. Paul's Library

Two recent photographs of the Cathedral, on left, from the South-East and, on right, on the direct South axis

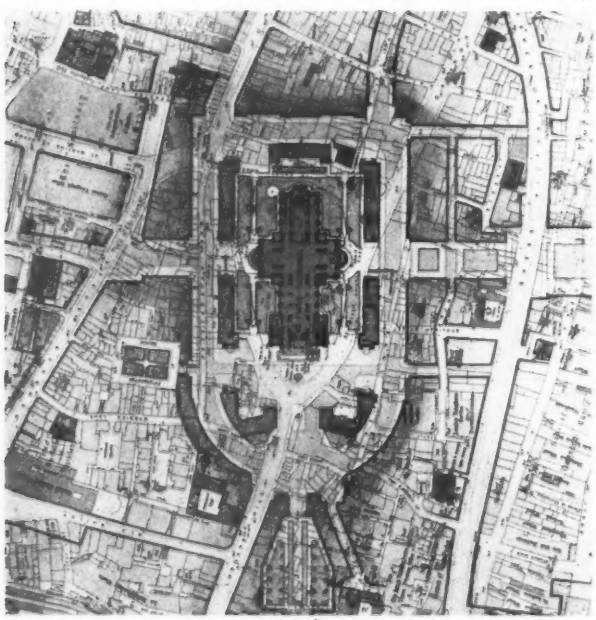
defined, and that unauthorised encroachment was at an end. Some of the houses that had come too close to the Cathedral on the North side were cleared away and the narrow exit to Cheapside was widened. The remnants of the gates appear to have been removed, only the narrow alleys and the names still remain to show their former position.

The height of the buildings was limited by the "Act for rebuilding the City of London" of Charles II. Houses in by-lanes might have two storeys and a garret, those in streets and lanes of note, and by the river, three storeys and a garret, and those in High and Principal streets, four storeys and a garret. St. Paul's Churchyard came in the last category. Buildings must be of brick or stone. This compelled a building to remain on its frontage line for its whole height. The old timber construction made it easy to project the upper floors forward, the new provision made it impossible. Encroachment, therefore, came to an end—by the defining of boundaries which kept a man to his own land, by the nature of the construction, which forbade the projection of the upper part of a building, and by the regulation as to the number of storeys, which prevented undue extension upwards. From this time, encroachments must, I fear, be attributed to the greed of churchwardens and other authorities, and to the filching of the common lands and fields.

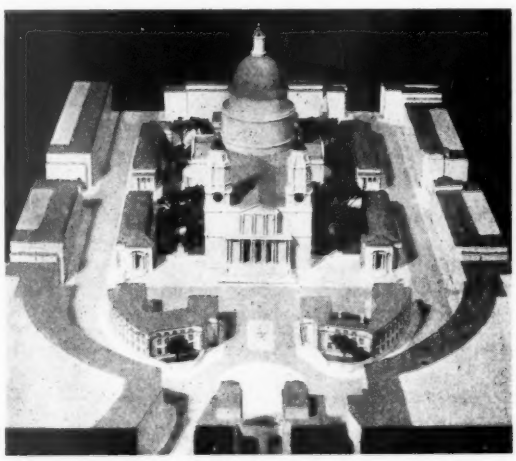
It is not always realised or acknowledged how extremely beautiful London was after Wren's period of rebuilding. His parish churches did not then stand, as so many of them do now, as solitary and refreshing evidences of skill and taste in acres of dull pretentious office buildings, though it must be admitted that many of the office buildings and banks of this century show a very high degree of architectural value compared with those of the later nineteenth century.

The Deanery and the Residentiaries' houses, the later dignified Chapter House, such houses as those in Laurence Pountney Lane, and the Inns of Court give us an idea of what the whole of rebuilt London was like. There was a unity of motive, of material, and of scale, between churches, houses and shops. Those beauties we now seek in for isolated places and rejoice to find, were once common to every London street. And above all towered and gleamed the white spires of Wren's churches, with the great Cathedral, as yet untarnished by smoke and dirt, unblanketed by high City buildings, crowning the whole scene.

Administrative buildings were largely of stone, others would be brick. The sash window, complete with glazing bars, was



Plan and air view: The St. Paul's area as laid out in the revised Royal Academy Plan, 1944



fairly general then, though the *fenêtre croisée*, the window with a central wood mullion and a single transom, still lingered. Doors and doorheads would show in increasing amount through the century that flavour of scholarship that is so desirable in urban building.

The orderly line of Wren's Piazza was not adopted for the immediate surroundings of the Cathedral. His Majesty's Commission in January, 1688, "ordered that the Churchyard be forthwith walled in or otherwise enclosed at such distances from the church on all sides, that the publique way without the said enclosure be left at least as broad in all places as the late Act of Parliament for the rebuilding of the Citty requires, and also that all sheds shops and other places, either of abode or trade, erected since the fire within the said Inclosure be forthwith demolished and removed."

The axial line of the Cathedral was altered partly to avoid old foundations, partly, perhaps, to bring the central line of the West Front on to the centre of Ludgate Hill. The enclosure finally resolved itself into Mr. Richard Jones "6d. per lb. cast and turned ironworks fence," which finally cost, we are told, £11,430 12s. 6d.

The many engravings of St. Paul's which were published in the eighteenth century vary a good deal in their enclosure details. The engravers evidently refused to be unduly influenced by what was actually existing, and having drawn the Cathedral as truly as they were able, gave their imagination a little play in the disposition of the railings. Sometimes these join the Church at the South Transept, others sweep by in one single length. Queen Anne has her own railings in some engravings, but is denuded of them in others. I like two engravings by Lens, 1713, one of which shows a very pretty arrangement of railings projecting from the wing walls of the South transept, a decided improvement on Schwertfuger and Parr. Both, however, show the railings joining the church at the South West tower.

Fourdrinier, 1743, has curved railings joining the South transept—not so architecturally satisfying as Lens. His West enclosure has a second curve.

Malton, in 1798 and 1801, shows the fence on the North side circling round the West enclosure and that on the South coming from the main transept wall instead of from the wing walls of the entrance steps. He also shows brick houses at the Cheapside entrance, with bow-windowed shops on the ground floor.

My notes on the third period can be brief. Holborn Viaduct was built in the 1860's, Queen Victoria Street in 1871, providing few architectural values comparable with those it must have destroyed, Ludgate Hill and Cannon Street were widened. In places where the mediæval plan was retained, the mediæval scale was abandoned, and higher buildings erected everywhere.

It is generally overlooked by those who, in these days, advocate the rebuilding of destroyed London on the mediæval plan, that the relation of height and general scale of buildings to the type of street is as important a part of the mediæval lay-out as the actual line of the street itself, and that a sixteenth century plan with twentieth century building heights is entirely inappropriate. If it be desirable to retain some of the narrow lanes of London to remind us of its history, then let the reminder be complete by extending it to the height of the buildings in the lanes.

Unaccompanied by street widenings, the raising of the height of the buildings in the narrow lanes and streets tended to restrict further and further the views of St. Paul's. The great warehouse blocks on the South of the Churchyard hemmed in the Cathedral, and the culmination was reached when a Government building reared its massive bulk and blotted out, in unseemly competition, some of the finest views of the dome.

Too many of Wren's churches were sold and demolished, though happily the storm of public protest which arose when the proposals were known prevented the wholesale destruction of some of the most beautiful of them all, only a few years ago.

I need not further describe to you the condition of the area as it exists to-day—it is there for all to see. The Cathedral itself, thanks to watchful care and unstinted effort, has suffered less than might have been the case, but all around it are open areas of devastation. And each successive clearance opened our eyes to the beauties which we had so culpably allowed to be shrouded and screened. London's citizens were unanimous in their demands that the views provided at such tragic cost should not again be obliterated. London has ever been ungracious to her own treasures, as I have shown, but this opportunity has made her determined that a worthier setting shall now be given to St. Paul's. What are the main principles which should govern such a setting? St. Paul's is not a Gothic church built over a period of hundreds of years, with alterations and accretions of every kind, which altered its design and plan from age to age. Such a building might either be set in cloistered seclusion, as in England, or be crowded upon by the town buildings, as are many of the Cathedrals of France. St. Paul's was the product of one man's mind, built during one man's lifetime. It is one of the greatest and noblest of the world's renaissance churches. Picturesqueness such as was beloved by Samuel Prout is entirely out of place in its vicinity. Wren's design demands first of all an orderly setting, whose lay-out shall bear a definite relationship to the building. Being peculiarly a City church, it should not be set in an open park with all the buildings far removed, yet it demands reasonable space around it, so that it may be seen from the dome top to the base, undisturbed by commonplace neighbours in irritating proximity.

Not only the plan, but the design of the setting should be related to the Cathedral. Nothing could ignore more completely the character of Wren's work than did most of the modern buildings surrounding the churchyard. While St. Paul's should not be so remote from London's traffic as to be separate and aloof, that traffic should keep at a respectful distance, and certainly be further removed from the Cathedral walls than it is to-day. All this is due to St. Paul's as an architectural treasure of the highest order. Had there been no bombing whatever, a long-term plan for London would include such objects as these, were we as solicitous for the well-being of our own fine buildings as we sometimes are for those of other cities. But at this stage, another suggestion must be considered, even though the men of our Forces are still at mortal grips with a powerful enemy, and we ourselves are under his fire, and that is the question of a National Memorial. This, I suggest, is not a matter for partisanship nor for "stunts." Decisions upon it are not for City Corporations nor Cathedral authorities alone. His Majesty's Government in the last resort will settle what shall be done. An ad hoc Commission may yet be appointed to consider and report on the location of such a memorial, and the form it should take, but in all humility suggestions may be made and, indeed, should not be withheld. To what do we wish to erect a memorial? Surely not merely to victory over an enemy, nor to the glorification of military prowess. The days of great memorial arches, complete with bas-reliefs of prisoners in chains, have gone, we hope, for ever. Nor should it be limited to the commemoration of those who have fallen in battle, although they would have an honoured place within it. Nor should it be of the nature of a provision of something for the public good, which a public ought, in any case, to provide for itself, war or no war. A truly national memorial should commemorate something more profound than victory—nothing less, indeed, than the great spirit and the high courage which will yet bring the nation to that victory, the spirit which actuated the men and women of the fighting forces and those who worked and endured steadfast for these long and bitter years, confident that ultimately right must prevail.

In the first world war we felt the need for crushing an attempt at military domination. In this war we are fighting against powers of evil which seek not only military success and all the material advantages that go with it, but also the crushing of freedom, of action, speech, and even thought. A national memorial, therefore, can hardly be of the same type as either the Cenotaph or the Scottish Memorial at Edinburgh, impressive though they be.

It seems to require a place apart to the extent that men, women and children may linger in serious contemplation of reminders of this greatest of national efforts, a place of remembrance, not of mourning, but of thankfulness and inspiration. Three years ago, I pleaded for terraced gardens to be carried from the South transept of St. Paul's down to the river, to give a dignified, beautiful setting to this view of the Cathedral. I had not then in mind any thought of a memorial, but later consideration points unquestionably to the appropriateness of this area as a possible site.

Here exist two of the three major glories of London. On the South is the River Thames, a thing of great natural beauty and superb dignity, on the North stands the Cathedral, the two ready to be linked together to provide a setting for a memorial which can hardly be paralleled. Between them to-day lies a largely devastated and cleared area. Crossing it are three busy traffic ways, the Churchyard, Queen Victoria Street, and Thames Street, Carter Lane and Knightrider Street being narrow lanes of minor importance. It is probable that the three main ways will be retained, not necessarily on their present alignment, while the two narrower ways could in part be dispensed with. Three defined areas are left, that from the river to Thames Street, that from Thames Street to Queen Victoria Street, and that from Queen Victoria Street to the new line of the Churchyard, whatever that may be.

Beginning at the river, the first area would be a riverside place, an extension of a possible continuous embankment road at this point, laid out on the axial line of the South transept.

The next area, up to Queen Victoria Street northwards, would begin the memorial proper—it would be an enclosed garden with cloister buildings on its East and West sides, and open stone screens to North and South.

The third portion from Queen Victoria Street to the Churchyard line would also be a terraced garden with cloisters on East and West.

Its southern screen would balance that across Queen Victoria Street, and so link the two garths together, and even the central street refuges at this point would also be designed as links of the scheme. The northern screen might be the background of a great open-air altar, not of sacrifice, but of thanksgiving. Beyond this would be seen the transept and dome of the Cathedral. They would appear to be a part of the memorial itself, as would also the building lay-out of the churchyard and the shaping of the new formal surround of the church, for these would be in harmony with the design of the cloistered gardens, their buildings and screens. These alone might not constitute, perhaps, a complete memorial, but when taken in conjunction with the Cathedral, the churchyard lay-out, and the river approach, would make a national memorial worthy of the name.

The gardens would have no traffic ways through them for vehicles, streets outside them on the East and West sides would give sufficient access from North to South, and would keep buildings a street's width from the memorial gardens. The cloisters would have pavilions not imitating, but perhaps reminding one, of the orangery in Kensington Gardens; in these, sculptors, painters, mosaic workers, and craftsmen of all kinds would show in reliefs, in colour, and in fine inscriptions, the story of a great national deliverance. Everything should be of superlative quality in design, in material, and in craftsmanship. There would be no grandiose effects either of garden lay-out or of buildings, dignity and nobility would be given by the river to the South, and the dome to the North. The memorial would conform with the English character, and be in line with the closes and cloister garths, the college courts and quadrangles, the squares and gardens of the Inns of Court. There ought to be no unwise economies in such a scheme. The area to be dealt with is not large and, compared with the gigantic achievement of the London of Wren's time in building the Cathedral itself, such a memorial as I have described would be but a modest effort for not London alone, but the whole nation.

The memorial gardens would be sunny places, dropping to the South, and would provide a setting for an annual service of thanksgiving in the space before the High Altar, with perhaps the combined clergy and choirs of Westminster Abbey and St. Paul's taking part.

There are no drawings as yet in existence showing such a scheme as I have outlined, but in the plans which the Royal Academy Planning Committee prepared under the chairmanship of Sir Edwin Lutyens, many of the points I have made were given expression. Although nominally a member of that Committee, other heavy responsibilities at that time prevented me from taking more than the slightest part in its work. I can therefore draw your attention to its schemes for St. Paul's without incurring the reproach that I am blowing a personal trumpet.

The Academy plans did not deal with the area as a site for a national memorial, but in spite of the drastic replanning they involved, a replanning which so terrified many people that they were unable to see the good points it contained, the general suggestions in the plans must be given the most serious attention if it ever is decided to place the memorial here.

The plans show an orderly and more spacious lay-out of the churchyard, the treatment of the churchyard as a single architectural problem instead of a collection of architectural oddments as it is to-day, the use of the adjoining buildings to enhance the beauty and importance of the Cathedral, the retention of views which have been opened up for the first time in living memory, the removal of traffic from the very steps of the church, and the provision of gardens from the Cathedral to the river. All these guiding principles must of necessity be incorporated in the design of a national memorial if it be placed on this site.

I have put before you but one suggestion for a national memorial. There will, I am sure, be many others which must receive consideration with this, and whatever is eventually decided by whatever Government is here to deal with the project, will, let us hope, be settled with the same unity which has brought us through desperate trials to the present day, and will continue until the Allied Nations achieve victory, and, let us hope, far beyond.

HEAT INSULATION IN DOMESTIC BUILDINGS

By S. F. NEWCOMBE

1. Heat insulation is used to reduce waste of fuel and to increase warmth for health and comfort. Architect, engineer, local authority, and builder should know what are the desirable standards of heating, and how to attain these standards by correct specifications, both of building design and of heating appliances.

The following notes deal mainly with smaller domestic work; for larger jobs the architect is likely to consult a specialist or heating engineer before starting any design requiring special heating plant.

2. Comfort and Total Cost

The real aim is comfort which must be achieved at the least total cost.

Comfort is affected by (1) air temperature, (2) relative humidity, (3) air motion, (4) radiant heat of surroundings.

Total cost is first cost fixed complete, plus the present value of fuel and other running expenses, of maintenance over a period of years, say 25, and amortisation.

The architect can reduce total cost easily if he studies how to prevent waste of heat. A leakage of water is easily seen and stopped; a leakage of heat is rarely thought of.

3. Leakage of Heat

There are many ways of preventing leakage of heat, but the most profitable are (1) correct insulation of buildings and heating appliances; (2) correct heating appliances to supply heat at the economic speed.

A therm of 100,000 B.Th.U.s is provided by (1) 8 lbs. of coal with 12,500 B.Th.U. per lb.; (2) 200 cu. ft. of gas; (3) 3,416 electric units. The cost of the "useful" therm will be taken at 10d. (see Appendix 1).

If one "chases the B.Th.U." or therms to see where they go, one will quickly find where they are used or wasted; but to do this one must have an elementary knowledge at least of the conventional terms of heat (see Appendix II), and be able to study figures.

Water is held in reservoirs, tanks, or jugs with an impermeable lining, the material to hold that lining has strength, but may be permeable; one could line a permeable pot with a thin lining of metal foil to make it impermeable to water. Similarly, heat is usually held in materials which are strong but highly conducting, such as metal or brick or stone, and the most impermeable lining to be found should be used to hold the heat.

There is no known impermeable material to heat, but Grade A insulators (App. III) are the least permeable available. Whether for buildings, ovens, or other appliances to contain heat, the Grade A insulator best suited for its purpose should be the inner lining to prevent waste of heat.

4. Materials

First, to consider materials and their qualities.

A list of materials used in building houses or heating appliances is given in Appendix III, with Conductivity (k) values. They are divided into:

Gde. A insulators, k below 0.5 B.Th.U. Density 25 lb. per cu. ft.
" B " from .5 to 1.1 B.Th.U. Density from 25-60 lb. per cu. ft.
" C " " 1.1 to 3 B.Th.U. Density from 60-100 lb. per cu. ft.
" D " " 3 to 4.5 B.Th.U. Density from 90-110 lb. per cu. ft.
" E " " 4.5 to 17 B.Th.U. Density from 110-120 lb. per cu. ft.
Metal up to 3,650 B.Th.U. Density from 160-710 lb. per cu. ft.

Low conductivity implies low density; and the same materials will have a different conductivity with a different density; in specifications, therefore, the density and conductivity should be given. For example, glasswool at 5 lbs. density has k=.22, at 9 lbs. k=.28, and at 12 lbs. k=.30. So insulating materials should be graded—as a rule, the lower the k value, the better.

A closed air space, whether $\frac{1}{2}$ in. to 4 in. wide, has a resistance of .5 to 1.0 B.Th.U., and is only equal to $\frac{1}{4}$ to $\frac{1}{8}$ in. cork; it is not always worth its cost. Sheets of $\frac{1}{4}$ in. or less of any material below Grade A have little value as insulators, unless they enclose air spaces. The air space lined with the $\frac{1}{4}$ in. sheet would then equal $\frac{1}{8}$ in. Grade A; and lined with $\frac{1}{2}$ in. fibreboard equal to $\frac{3}{4}$ in. Grade A.

Aluminium foil dividing two air spaces and bound externally by two $\frac{1}{4}$ in. sheets equals 1 in. Grade A, and has a heat capacity of about 0.5 B.Th.U. per sq. ft.

5. Correct Use of Materials

It is important to know the relative values of different materials or combination of materials for heat insulation. Conductivity, density and price must be weighed with other qualities, damp proofness, fire resistance, durability to retain insulation (some materials settle and become more dense and less resistant to heat).

For example, compare a 1 in. Grade A material, 6 in. foam slag, and 27 in. brick. Their heat transmittances (U values) are equal. See Table I below.

With outside air at 30 deg. F., and inside air to be raised from 30 deg. to 60 deg., the heat input is 12 B.Th.U. per hour per sq. ft., of which 9 B.Th.U. heats the walls until a steady state is reached, and the remaining 3 B.Th.U. are lost by transmittance to the outer air. The heat required to raise the air temperature is very small.

The Grade A wall will reach a steady state in $\frac{1^2}{6}$ B.Th.U.s in 1 hr. 20 mins.

The 6 in. foam slag wall will reach a steady state in $\frac{1^3}{2^2}$ B.Th.U.s in 14 hours.

The 27 in. brick wall will reach a steady state in $\frac{7^3}{8^2}$ B.Th.U.s in 80 hours.

TABLE I

A wall of a house	Weight lbs. per sq. ft.	Specific heat	Heat absorbed to raise wall		k.	U.	Heat loss per sq. ft. per 30 deg. diff. inside and out
			$\frac{30}{2}$ deg. = 15				
1 in. Grade A with sheeting (1 lb. Grade A 3 lbs. sheeting)	4	.2	$(4 \times .2 \times \frac{30}{2})$	12.	.27	.21	6.3
6 in. foam slag	32.	.27	$\frac{32 \times .27 \times 30}{2}$	130.	1.5	.21	6.3
27 in. brick	247.	.195		722.	8.	.21	6.3
Air in the room (at 2 cu. ft. per sq. ft. of surface)	.075	.24	1.08 (0.075 × .24 × 2 × 30) to raise 2 cu. ft. air to 60°				

But after the steady state is reached, the heat input can be reduced from to 6.3 B.Th.U. per hour per sq. ft. in each case.

The Grade A wall lacks strength and stability unless supported by other materials. Fire resistance, damp proofness, and appearance must be considered ; 27 in. brick has far more strength, fire resistance and durability than is needed, and probably absorbs too much water.

In Malta, a house was built of 6 in. local limestone, of porosity up to 40 per cent. ; two coats of hot bitumen were given to keep out the damp, and there was cork in walls and ceilings for heat insulation and sound absorption. The saving over the standard house with 2 ft. walls, according to by-laws, was 12 per cent. in first cost, and a big sum in fuel costs capitalised. The occupant felt far more comfortable than in other houses. The stone was used in 1930 for strength and durability, with a factor of safety which sufficed to withstand the bombing in 1942. The outward appearance was that of houses conforming to the by-laws. Fire resistance was ample. The special qualities of bitumen and cork were used, each to its own purpose and at least cost.

6. Appliances should fit their purpose. In practice, the appliance giving only 12 B.Th.U. per hour per sq. ft. input would not suffice for the heat capacity of the 27 in. brick wall, and be more than enough for the 1 in. Grade A wall after 80 minutes' use in the above conditions.

Hence the rating of the appliance does not depend on U values, which in this case are equal, but on the rate at which inner surfaces are warmed ; that rate is proportional to k multiplied by heat capacity (or roughly rather less than k^2) (see Appendix II). Not only can the first cost of the appliance be reduced, but the present value of the annual fuel cost, the greater of the two costs, will be much less.

Gas and electric heaters, whether in rooms or ovens, should always have inner linings which heat up speedily.

7. Intermittent Heating is cheaper than continuous heating, if properly designed and controlled appliances are used. The Building Research Report, 1932, p. 86, states : " The experiment shows that this intermittent daily heating requires three-quarters of the expenditure of thermal energy for the continuous heating for the particular test." People only want heat in certain rooms at certain times, and the weather changes ; and the quantity of heat needed and time when needed vary more than English weather, or than day and night temperatures. Let the appliance be suitably designed and controlled to supply heat quickly as and when wanted.

Suppose water flows into a tank 10 ft. high, and flows out through a narrow slit from top to bottom at the same rate. The tank remains full. Shut off the water till its level falls to 6 ft., and then turn it on again till it reaches 10 ft. Less water has been lost than if it had been kept at 10 ft. So with heat in a building. There has been less temperature difference between the inner and outer air, multiplied by the U value, when the heat was shut off.

There is a popular but lazy thinking idea that a domestic boiler or hot-water cylinder should not be lagged, because it heats the room or the house as well as heating the water. The appliance should be such that the owner can control the heat for the purpose required ; it should not serve many purposes without control for each purpose.

8. Heating appliances should be correctly fitted. Lagging of 1 in. to 2 in. Grade A should always be applied (*a*) behind radiators, or external walls ; (*b*) behind the fireclay of an open grate.

(*a*) Tests at the University of Illinois showed a saving of 6.5 per cent. of fuel by placing reflective insulation behind radiators.

(*b*) 2 in. Grade A lagging behind the open grate saves some 10 per cent. of fuel to give the same heat, increases radiant heat, and speeds up the lighting of fires ; coke is more easily used.

These two points ought to be common practice always ; to omit such lagging is to waste money.

9. Speed in Heating up a room is illustrated in a Building Research Report. A physicist liked to breakfast in a temperature of 60 deg. F. at 9 a.m. His dining room had unlined brick walls. He lit the fire at 7.30 a.m., when the temperature was 45 deg., rising to 60 deg. by 9 a.m. He then lined the walls with a wood panel and air space, and lit the fire at 8.30 a.m., raising the temperature from 45 deg. to 60 deg. by 9 a.m. He had an extra hour in bed and saved 60 per cent. in gas (increased comfort at reduced total cost).

A furnace was heated up to 2,000 deg. F., having linings of (*a*) lagging bricks Grade B, or k=1.0 ; (*b*) normal fire bricks ; (*a*) saved 66 per cent. of gas and 66 per cent. of time over (*b*) ; see Bulletin of the American Ceramic Society, vol. 12, 1941, pp. 437-42, by D. J. D. McCullough.

Similar tests with domestic ovens give similar results because the inner surface is heated quickly (1) if the inner lining is filled with heat due to its low heat capacity : specific heat × density × rise in temperature ; (2) slight loss by transmittance because the U values are low. Once a " stable state " is reached, only (2) transmittance operates.

10. Warming the Surfaces

Intermittent heating requires :

(1) An inner surface to heat up quickly (see App. III, Col. 6).
(2) The wall to reach a " steady state " quickly (see App. III, Col. 3 (heat capacity)).
(3) The wall to transmit the least possible heat (see App. III, Col. 5 (k values)).

Para. 13 shows that a wall, with U=1.0 or U= 0.1, will have inner surface temperatures of 39 deg. or 57.9 deg. respectively, if the inner air is at 60 deg. and the outer air at 30 deg.

The subject is complicated, but the following example partly illustrates the point :

Assume 30 deg. outside air to be raised to 60 deg. inside, i.e., T = 30 deg. ; H, the heat inlet or no. of B.Th.U. per hr. per sq. ft. = 25 ; and when the inside air becomes 10 deg., the thermostat cuts off H to equalise the heat loss of U × T (temp. diff.).

If 25 B.Th.U. are inlet, most B.Th.U.s will be absorbed into the wall until the " steady state " is reached, but part will be lost by transmittance. The following are assumed : absorbed and transmitted, 18+7, 20+5, 22+3 and 18+7 for the 9 in. brick, 4 in. foam slag, 1 in. cork, and 1 in. deal walls. (See Table II opposite.)

Thus, the 1 in. deal uses 70 per cent. less heat in 14 hours than the 9 in. brick wall, though its U value is greater, and almost the same heat as a 4 in. foam slag wall, though its U value is 65 per cent. greater.

These figures must not be taken too literally : they are roughly true only. Usually one wants a warm surface in a few minutes, not hours, and the conditions are, therefore, not as stated. More research is needed regarding the warming of surfaces for materials with and without air spaces before precise figures can be accepted ; but the figures in App. III, Col. 6, give the order of merit of materials which warm up quickly (excluding the use of air spaces).

Compare two jars (*a*) of 10 gallons, (*b*) of 3 gallons capacity, but both, when full, leak at the rate of 1 gallon per hour. If (*a*) and (*b*) are both filled in 1 hour and then the water is turned down to keep them full, at the rate of 1 gallon per hour, then total consumption of water in 6 hours will be (*a*) $10\frac{1}{2}+5$ gallons, (*b*) $3\frac{1}{2}+5$ gallons.

Architects and engineers who design heating appliances, whether walls, roofs, chimneys, ovens, or high temperature furnaces, usually neglect the fact that heat capacity (or density) matters as well as the U values, and that total heat loss therefore varies between k and k^2 of the linings.

TABLE II

Wall	U.	Time to reach "Steady State": Heat capacity	Thick-ness	Heat inlet	60-30 / 2	Hours	Total B.Th.U. consumed in 14 hrs.
9 in. brick	.42	2.5 ×	$\frac{9}{12}$ ×	$\frac{1}{18}$ ×	15	= 13.5	13.5×25+.5×.42×30 = 344 B.Th.U.
4 in. foam slag	.27	17.5 ×	$\frac{4}{12}$ ×	$\frac{1}{20}$ ×	15	= 4.4	4.4×25+9.6×.27×30 = 188 B.Th.U.
1 in. cork enclosed in ¼ in. A.C. sheets	.2	3.3 ×	$\frac{1}{12}$ ×	$\frac{1}{22}$ ×	15	= 0.87	.87×25+13.13×.2×30 = 101 B.Th.U.
		24 ×	$\frac{1}{24}$				
1 in. deal	.44	13.3 ×	$\frac{1}{12}$ ×	$\frac{1}{18}$ ×	15	= 0.93	.93×25+13.07×.44 ×30 = 196 B.Th.U.

The inner surface should be heated as quickly as possible. An inner lining of 1 in. to 2 in. Grade A will have density below 20 lb. per cu. ft., and k below 0.45 B.Th.U. therefore absorbs little heat to reach a "steady state" and also transmit slowly. The outer wall or frame is needed for strength, durability, etc.

11. Standards Required in Dwellings. *The Computation of Heat Requirements*, I.H.V.E., 1942, pp. 3 to 8,* recommends an air temperature of 65 deg. F. for living rooms, 60 deg. for service rooms, 55 deg. for bedrooms, and assumes an outdoor temperature for design purposes of 30 deg. to 32 deg. F. A rise of 30 deg. is usually assumed for calculation of heat input.

The average outdoor temperature is about 42 deg. F. for the heating season of seven months (5,000 hours), and with an average indoor temperature of 62 deg., a rise of 20 deg. for 5,000 hours is taken as the annual need. These figures may be slightly too high in some areas.

House Construction,** para. 183, advises the following U values :

Appliances with Heat Input	Controlled U.	Uncontrolled U.
External walls of living room	.15	.20
Rest of house	.20	.20
Ground floor	.15	.15
Roof and top ceiling	.20	.30

To provide these transmittance values, there should be used just enough of the outer material for the required strength and stability, with a factor of safety of 4 or 5, anything over being wasted, and Grade A insulation inside to attain the desired U values.

The pitched roof is an umbrella and should be weatherproof, of tiles or slates felted ; but boarding is not wanted, and therefore waste. There is no advantage in insulating the attic, unless one lives there. Insulation in the ceiling, below the attic, should be at least 1 in. Grade A or more.

The heat under the ceiling is higher than against walls, so rather more insulation is wanted. Cisterns and pipes should be below the insulation, which can be raised to cover them.

Where insulation is used to prevent concrete from expansion, as in the tropics, it should clearly be above and not below.

A white surface should suffice in temperate zones.

12. The Internal Lining saves more heat than the external lining, as is indicated by the following example of 9 in. brick wall, with a lining of 1 in. Grade A (*a*) inside, (*b*) outside.

Air outside is 30 deg., and inside is to be raised from 30 deg. to 60 deg. The U value in either case of 9 in. brick with 1 in. Grade A is 0.175. After a steady state is reached, the temperatures will be as in Table III below.

Most of the absorbed heat flows to the cold air outside, with surface resistance .3, instead of resistance .7 inside. Obviously, (*a*) will heat up more quickly and requires less total heat to warm the room than (*b*).

13. Dampness of Walls absorbs quantities of heat.

A 9 in. brick wall may contain 20 lbs. of water per sq. ft. of surface. If only 5 lbs. are absorbed internally by conversion into vapour, some 5,000 B.Th.U. per sq. ft. will be used up because the latent heat of water at 60 deg. is about 960 B.Th.U. (to convert 1 lb. of water into vapour). This latent heat is used to advantage in the tropics, where water is sprayed on walls and roofs to cool them by evaporation.

But to use fuel to absorb moisture from walls is costly ; hence the inner lining should be damp-proof. Bitumen (as a bitumen felt) inside the outer wall is one way of achieving this end, and is perhaps better than an air space.

Vapour can pass through the inner lining from the humid inside air, and so condense in mid-wall at a lower temperature, which may reduce the value of the insulation. Insulation should, therefore, be made damp-proof on the inner as well as the outer face.

14. Condensation is the deposing of water vapour held in the air on a surface colder than the air.

Dry Bulb	30 deg. F. Outer air.				60 deg. F. Inner air.				
Wet Bulb	30	28	26	24	60	56	52	48	46
Relative humidity	100	80	60	40	100	80	60	40	32
Dewpoint	30	25	19	11	60	53.5	46	35.5	30

TABLE III

(a) Lining inside	Temperature	B.Th.U. absorbed per sq. ft.	(b) Lining outside	Temperature	B.Th.U. absorbed per sq. ft.
Inside air	60			60	
Inner surface	56.3			56.3	
1 in. Grade A	47 (average)	3	9 in. brick	53.3 (average)	350
9 in. brick	34.5 ,,	86	1 in. Grade A	41 (average)	1
Outer surface	31.5			31.5	
Outside air	30			30	

If the lining is inside, the 9 in. brick absorbs 86 B.Th.U.
If the lining is outside, the 9 in. brick absorbs 360 B.Th.U.

* Recommendations for the computation of heat requirements for buildings. As embodied in the guide to current practice, etc. Institution of Heating and Ventilating Engineers. 8vo. pam. 1942.

** Post-War Building Study No. 1. House Construction by Interdepartmental Committee appointed by Minister of Health, Secretary of State for Scotland, and Minister of Works. 8vo. 152 pp. H.M.S.O., 1944.

TABLE IV

Col. 1 U		Col. 2 1 in. Grade A	Cost of heat loss for 1 yr. U as in Col. 1	Cost of heat loss for 1 yr. U as in Col. 2	Cost 12 years U as in Col. 1	Cost 12 years U as in Col. 2	Cost 25 years U as in Col. 1	Cost 25 years U as in Col. 2	Saving s. d.
1.0	becomes	.23	10d.	2.3d.	100d.	23d.	165d.	38d.	12 3
.5		.19	5.	1.9	50	19	82	31	4 3
.4		.17	4.	1.7	40	17	66	28	3 2
.3		.15	3.	1.5	30	15	50	25	2 1
.23		.13	2.3	1.3	23	13	38	21	1 5
.13		.09	1.3	0.9	13	9	21	15	0 6

TABLE V

Walls	1 Cost per sq. yd.	2 U.	3 Heat loss per ann. per sq. yd.	4 (1) and (3)	5 Cost per sq. yd. plus heat loss 25 years
	s. d.		s. d.	s. d.	s. d.
4½ in. brick plastered	8 3	0.49	3 8	11 11	68 3
4 in. concrete unplastered	4 9	0.65	4 1	8 10	73 3
9 in. brick plastered	12 9	0.38	2 10	15 7	60 0
11 in. brick plastered	15 0	0.28	2 1	17 1	50 0
4½ in. brick-lined with 1 in. cork, damp-proofed and cement rendered	13 6	0.15	1 2	14 8	32 0
½ in. fibreboard on battens	11 9	0.24	1 9	13 6	41 6
Outer sheet (A.C. or C.I.) 3½ in. slagwool in bitumen paper ; inner sheet on 4 × 2 in. studding at 2 ft. centres	15 0	0.08	0 7	15 7	25 0

The hotter the air, the more water vapour it absorbs ; as the air cools the less it holds and deposits moisture when the " relative humidity " is 100 per cent. The temperature of the air will then be at " dewpoint." Thus, if the air temperature is 60 deg. and relative humidity 80 per cent., the dewpoint is 53.5 deg. A wall surface will be 57 deg. and be dry, but a window surface might be 39 deg. and be damp from condensation on its inner surface.

The outer air might be at 30 deg. and its relative humidity 80 per cent., and therefore its dewpoint 25 deg. and the windows' outer surface would be dry. The inner air at 60 deg. has absorbed moisture from cooking, washing, body moisture, etc.

If only the outside air is being warmed, no condensation can occur because condensation comes from moisture added from inside.

If the inside air of 60 deg. and relative humidity 80 per cent. mixes during its cooling with outside air of 30 deg. and relative humidity 80 per cent., clearly the average dewpoint will fall between 53.5 deg. and 25 deg.

If the wall surface cools more slowly than this falling dewpoint, no condensation occurs.

The better insulation off the inner surface, the more is condensation reduced, but not entirely prevented.

If cold, dry weather (30 deg. and 80 per cent. relative humidity) is succeeded by warmer weather, 45 deg. and 100 per cent. humidity or rain, the inner surfaces in unheated rooms will be at about 30 deg. Temporary condensation from the warmer humid air at 45 deg., 100 per cent. humid, and, therefore, dewpoint of 45 deg. will occur until the surface is warmed.

The quicker the surface warms up, the sooner temporary condensation disappears. Again, an inner lining of Grade A insulation ensures quick heating of the surface.

An absorbent surface will absorb but not prevent condensation.

Diagrams on page 260 indicate inner surface temperatures after a steady state is reached, with inner air at 60 deg. and outer air at 30 deg.

U.	Inner surface.	U.	Inner surface.
1.0	39	.3	53.3
.5	49.5	.2	55.8
.4	51.6	.1	57.9

This table shows that the higher the value of U, the higher the inner surface temperature above the dewpoint.

15. The Warmth Factor

The Warmth Factor in Comfort at Work, by Bedford (H.M.S.O., 1936) shows that one should feel equally warm with both surfaces and the air at 64 deg., as with wall surfaces at 72 deg. and air at 60 deg., or with walls at 60 deg. and air at 70 deg. The higher temperature the inner wall surface, the less heat is radiated from the body, and so the lower can be the air temperature to give the same comfort. Bedford found that 62.7 deg. is the best equivalent temperature experienced by a person, including air movement, air and boundary temperatures, and relative humidity. It is measured by an Equivalent Temperature instrument, the Eupatheoscope, because the thermometer only measures air temperature and omits other factors of comfort.

16. Air Control is a separate subject, and includes ventilation, prevention of draughts from cracks in door and window frames, etc.

The numbers of B.Th.U.s to raise 1,000 cu. ft. of air from 30 deg. to 60 deg. is only 540 B.Th.U., and the example in para. 5 showed how little heat is used to warm the air compared with heat losses in the walls.

17. Other Factors Affecting Comfort. Solar heat and its absorption into walls, the siting of buildings, exposed or sheltered, air motion, draughts from doors and windows, relative humidity, radiant heat, all affect comfort, but do not alter the need for correct insulation and are omitted.

18. Savings in Cost. *Cost of insulation* and its savings are broadly indicated in the following calculations. These figures can only be a guide, because the assumption cannot be accurate for all purposes and places.

Assume : The outer air average 42 deg., inner air 62 deg., difference 20 deg. F. for the heating season, 7 months, or 5,000 hours.

Cost of heating, per " useful " therm (see App. 1)., 10d.

Cost of 1 in. Grade A insulation, per sq. ft., fixed complete, 6d.

Present value at 3½ per cent. compound interest of £1 per annum for 12 years, £10 ; 25 years.

Then a wall with U=1 B.Th.U. and temp. diff. of 20 deg. loses 1 × 20 × 5,000 B.Th.U. per heating season, *i.e.*, 1 therm, costing 10d.

If a wall, such as a thin sheet, has U=1.0, as in Column (1) and if 1 in. Grade A insulation (k=0.3) is added to the thin sheet, then U becomes 0.23 as in Column (2). See Table IV, above.

By adding 1 in. insulation Grade A to a wall with U=1.0 B.Th.U. at 6d. per sq. ft., 20 deg. difference for 5,000 hours per annum, the saving in 25 years is 12s. 3d.—6d.=11s. 9d.

By adding 2 in. : B.T.hU. at 1s., saving in 25 years is 12s. 3d. + 1s. 5d. — 1s. = 12s. 8d.

By adding 3 in. : B.Th.U. at 1s. 6d., saving in 25 years is 12s. 3d. + 1s. 5d. + 6d. — 1s. 6d. = 12s. 8d.

Under the above conditions, it will pay to add 2 in., but not 3 in. Grade A, to a wall having U=1.0.

19. Cost Estimates : Particular Wall Structures. Table V is a rough estimate of certain walls at pre-war cost, adding in the cost of heat losses as given in Table IV.

(1) Estimated cost per sq. yd. pre-war of certain walls.
(2) U values (from p. 18, *Heat Requirements*).
(3) Cost of heat loss (from Table 1 multiplied by 9) per sq. yd., instead of sq. ft.
(4) Cost per sq. yd. of walls and of heat loss for 1 year (Columns (1) and (3) added together).
(5) Cost per sq. yd. of walls and of heat loss for 25 years (Columns (1) and (3)×16½).

The figures in Table V, though approximate, are roughly confirmed by many actual tests, especially in America, and explain the standards for insulation laid down in *House Construction* (see para. 11). The saving by insulation applies equally to ceilings and roofs.

To summarise the above. It takes ten or more times as long to heat a brick-walled room from 30 deg. to 60 deg., as to heat one with an inner lining of 1 in. to 2 in. Grade A insulation.

The functions of a wall are strength and stability, with a factor of safety of 5, Fire Resistance Grade E (B.S.S. 476), durability for a given number of years 10, 25, or 40 as required. The outside wall must have these qualities as well as be of good appearance. The inside lining should be damp-proof, incombustible, a Grade A insulator, and suitable for decoration with low maintenance cost.

To provide the U values recommended in *House Construction*, use inner linings of 1 in. to 2 in. Grade A insulation, the most impermeable to heat, consistent with price, and other qualities. The inner lining should be damp-proof to prevent vapour from inside condensing in the insulation and reducing its efficiency. If the inner lining be so specified, the outer lining need not be counted for insulation.

Inner linings of ¼ in. or less and Grade B insulation have negligible insulating value ; but with an air space are equal to ⅓ in. Grade A. With a 1 in. to 2 in. Grade A lining, the inner surface temperature rises quickly and a steady state is quickly reached without much loss in absorption. These conditions favour intermittent heating, which in domestic dwellings should be cheaper than continuous heating. But the appliances should give the heat input required for the room.

The higher the inner surface temperature of wall or ceiling, the lower can be the air temperature to give " equivalent temperature."

Double windows halve heat losses in windows, and are an economy in some cases, especially on the north side.

Always insulate behind radiators on external walls and behind the fireclay of the open fire.

Ceilings to pitched roofs and flat roofs should be especially insulated with 1 in. to 2 in. Grade A ; the temperature difference is greater at this point, and little heat is absorbed for heat capacity; so the reserve is small.

The pitched roof should be weather-tight, but it is not necessary to insulate it, unless the attic is a living room.

Cold water cisterns and pipes should be kept below the insulation of the ceiling, which can be raised to cover them. The warm air of the house will then always reach them, and frozen pipes should only occur in unoccupied houses.

If architects will specify for all houses on the above lines, manufacturers will produce the required Grade A materials at an economic price, being assured of a definite demand.

There are some 12 million houses ; an average of 1 ton of coal saved per annum per house means a capital saving of some £400,000,000. Those who design houses can effect saving by specifying efficient apparatus.

20. Insulation for other than Walls and Ceilings

Architects should also specify correct insulation for other items besides the inner linings of walls and ceilings.

Table VI below shows the saving in B.Th.U. per hour per sq. ft. for flat surfaces with inner temperatures as in column 1, and outer air 70 deg. F. Column (2) gives the heat losses for bare or non-insulated surfaces, and (3) if correctly lagged.

Lagging is estimated at 1s. per sq. ft. for temperatures of 50 deg. and 227 deg., but 2s. per sq. ft. for temperatures of 340 deg., 450 deg., and 500 deg. F.

The therm is estimated at 5d., too high in some cases, too low in others, hence corrections are needed for individual cases. See Table VI below.

Thus, 145 B.Th.U. saved for 1,720 hours saves 249,400 B.Th.U. or 2½ therms at 5d., which equals 1s., the assumed cost of lagging.

With the above information, it is clear that architects should specify :

(*a*) ½ in. to ¾ in. lagging to h.w. pipes and cylinders.
(*b*) Lagging, to all domestic boilers.
(*c*) Lagging up to 2 in. Grade A, for all ovens, coal, gas or electric, which have an internal temperature up to 400 deg. F. The temperature difference is far greater than for refrigerators, yet these should have 2 in. lagging.
(*d*) Lagging to all fronts of coal appliances, especially at the firebox. The temperature of the fire in ranges is over 700 deg. F., yet the door is usually open and not lagged, and the heat loss at this hottest place is enormous.
(*e*) 1 in. to 2 in. lagging behind radiators and open domestic grates, especially on external walls ; see para. 8.

21. Tests on Heating Appliances

Useful therms are the amount of heat absorbed by food, water, etc., in cooking and heating therm.

1. Gross therms are the amount of heat actually consumed.

Two electric ovens of the same size (*a*) lagged, (*b*) normal, were tested to boil 3 pints of water from 68 deg. to 212 deg.

The useful heat to boil 3 pints of water is .. .. 550 B.Th.U.
The gross heat used in (*a*) was .76 units×3412 .. 2,600 B.Th.U.
The gross heat used in (*b*) was 1.365 units×3412, 4,310 B.Th.U.

The useful heat was, therefore, in the proportion of 1=4.8=8, or (*a*) had a gross to useful heat ratio of 4.8, and (*b*) a ratio of 8. The heating up time in (*a*) was 11 minutes, in (*b*) 30 minutes.

The total saving of (*a*) over (*b*) was estimated to be 40 per cent. to 50 per cent. If the cost with the normal oven is 3s. a week, or £8 per annum, it would be for the lagged oven 60 per cent. of £8, £4 16s., saving £3 4s. per annum.

E. W. B. Dunning, in a report,* says that there is a saving of 20 per cent. of gas by insulating the oven. If £5 per annum is now spent on gas for cooking, the present value on the saving in 25 years would be £16½.

In 1937, about 48 per cent. of the gas consumed in Great Britain was used in domestic cooking ; which would be 9 million tons of coal converted into gas, coke, etc.

* E. W. B. Dunning and R. F. Hayman: Domestic Gas Ovens. Paper to London and Southern District Junior Gas Assn. 1938. February 15.

TABLE VI

(1) Temperature inside pipe or oven	(2) Loss in B.Th.U. per hour per sq. ft. Bare	(3) Lagged	(4) B.Th.U. saved per hour per sq. ft.	(5) No. of hours to repay lagging by cost of fuel saved, at 5d. per therm
150	167	22	145 } at 1s.	1,720
227	378	43	335 }	750
340	826	60	766 }	650
458	1,452	87	1,365 } at 2s.	365
600	2,670	106	2,564 }	

A saving of 20 per cent. on the gas consumed might be about £5 millions per annum, or £80 to £100 million capitalised ; to achieve such a saving, the hotplate should be designed also to save 20 per cent. of its heat.

2. About 18 of 72 in. ranges were tested by the M.O.W. at different factories, (*a*) 9 were lagged, and (*b*) 9 unlagged.

(*a*) used 6 lbs. of coal per hour, (*b*) used 11 lbs. of coal average to maintain the same temperature.

The saving of 5 lbs. of coal per hour in a range, used 6¼ hours daily, is 5 tons per annum, and at £3 per ton, £15 per annum.

The present value of £15 per annum for 25 years is	£247
The extra first cost of (*a*) over (*b*) was	3
Saving in present value	£244

Even if half these figures are accepted, the savings are enormous.

Fuel in ovens, heating appliances, etc., can be saved partly by correct lagging, properly applied, partly by adjusting air control and other means.

Correct insulation in ovens and other appliances (as in houses) saves time in heating up and fuel in cooking.

Chimneys are only one part of a heating appliance to cause the required draught, and to carry away the fumes. At £20 or more each, they are rather expensive for their purpose. Who is responsible to improve the efficiency and reduce the cost of this heating appliance ?

22. Specification of Appliances

If architects will specify a gross to useful heat ratio and demand efficient appliances, the manufacturer will make and supply what is ordered. The first cost will be low if the demand is regular and of certain standard sizes, ensuring mass production. The total cost will be greatly reduced.

The correct use of insulation is known to scientists and a few industries, but very little known to builders ; its use, therefore, has been neglected.

Appliances must be standardised ; their main expense is the *cost of the fuel they consume.*

There should be a standard test for every appliance to compare the "gross" heat with the "useful" heat, providing a ratio.

Appliances can be graded and sold by this ratio. The test can be simple and does not affect the cooking tests.

By using the k and other values in Appendix III, it is easy and interesting to calculate where the waste heat goes to ; absorbed by and transmitted through the materials of the oven. The amount lost by incorrect use of metal will then be seen.

Appendix I

Coal	12,500 B.Th.U. per lb.	=8 lbs. to 1 therm
Gas		=200 cu. ft. ,,
Electricity Unit ..	3,416 B.Th.U.	=29.27 units ,,

Cost of Coal	Per Gross Therm	Per useful therm Open Fire Efficiency 15 per cent.	Efficiency of Boiler 25 to 50 per cent.
42s.	1.8d.	12d.	7.2 to 3.6d.
46s. 8d.	2.d.	13.3d.	8 to 4d.
58s. 4d.	2.5d.	16.2d.	10 to 5d.
60s.	2.57d.	17d.	10.3 to 5.1d.
70s.	3.d.	20d.	12. to 6.d.

Coal in domestic use, the gross therm divided by the efficiency on average is taken at (useful therm) .. .. .. 10d.

Gas at £3 part tariff and 5d. per therm (add 2d. per therm if 360 used p.a.) (gross therm) .. .. .. 7d.
Efficiency of flueless gas heater, 82 per cent. (useful therm) 8½d.
Efficiency of flueless gas fire at 64 per cent. (useful therm) 10½d.

Electricity at £3 p.a. and ½d. unit and 11,000 unit p.a. (gross therm) .. .. 1s. 5d.
Efficiency electric fires 85 per cent. to 100 per cent., and ½d. per unit (useful therm) .. .. 1s. 8d. to 1s. 5d.
The efficiencies given above are taken from various books and are only rough estimates.
For calculations in Tables 1 and 2, the useful therm for all fuels is taken at .. .. 10d.
In factories, the plant is more efficient and a reasonable estimate may be .. .. 5d.

Present value of annuity at £1 per annum for :—

Compound interest	12	20	25	30 years
3½ per cent. ..	9.66	14.2	16.48	18.4
5 per cent.	8.86	12.46	14.09	15.37
	40	50	60	100 years
3½ per cent. ..	21.35	23.45	24.95	27.65
5 per cent.	17.16	18.25	18.93	19.83

In the table taken as 10 and 16½.

Appendix II

The following symbols are laid down in B.S.S. 874.

No. of B.Th.U. per hr. per sq. ft. per 1 deg. difference in temperature.

Thermal conductivity, k. in temperature between the inner and outer *surfaces* of a homogeneous material *1 in. thick.*

Thermal conductance, **C**, in temperature between the inner and outer surfaces of a material (homogeneous or not) *of any thickness.*

Thermal transmittance, U, in temperature between the inner and outer *air* on one side and *air* on the other and *of any thickness.*

Surface coefficient or surface conductance, in temperature between the inner and outer to or from a surface to the air surrounding it.

Thermal Resistivity in $= \frac{1}{k}$
Thermal Resistance is $R = \frac{1}{C}$
Total Thermal Resistance $\frac{1}{U}$
} No. of hours for 1 B.Th.U. to be transmitted through 1 sq. ft. per 1 deg. diff.

Note.

k refers to a single material of 1 in. thickness ; it is the standard for N.P.L. tests.

C can refer to a composite material of any thickness ; k and C are measured from *surface* to *surface.*

U can refer to a composite material of any thickness ; U is measured from *air* to *air.*

Thermal Transmission, q, is the number of B.Th.U. transmitted per hour per A sq. ft. or linear foot (or other area) per 1 degrees difference of temperature, whether from surface to surface or air to air.

When using q, the conditions of area and of temperature *must* be stated. When using U, per 1 hr. per 1 deg. diff. of temperature is understood and *not* stated.

q is generally used for heat loss from pipes per hour per linear foot and 1°F. difference in temperature ; all data are quoted.

U is used for loss of heat in roofs and walls.

Transmission and Transmittance, therefore, have different meanings, and if B.S.S.874 is accepted, they ought not to be misused.

The Computation of Heat Requirements, I.H.V.E., p. 30, gives different internal and external surface resistance for walls, roofs, and floors. For walls, it is general to take $\frac{1}{f}$ surface resistance, internal=.7 and external=.3.

Heat Requirements, p. 24, recommends the Resistance of an air space =1. This equals the Resistance of ¼ in. Grade A with k=0.25, and ½ in. with k=.33. The value of air spaces is usually less than these figures, because the spaces are rarely closed. They are useful for insulation only if their extra cost is justified.

Appendix III

Heating, Piping and Air Conditioning, June, 1942, published the columns (1) to (5) for the first 12 materials ; other figures are mostly from N.P.L. or Engineering handbooks ; Col. (6) and some others are computed. None are guaranteed, but are useful for rough comparison.

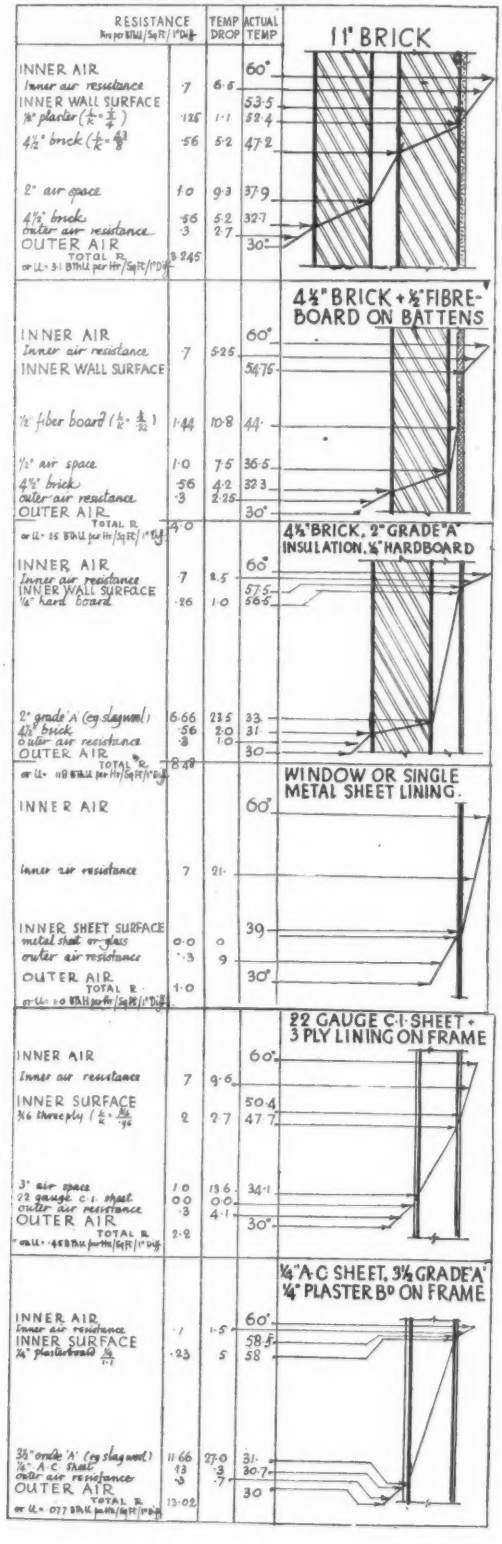
Insulators, Grade A	**(1) Specific heat**	**(2) Density, lbs. per cu. ft.**	**(3) Heat capacity, B.Th.U. per cu. ft.**	**(4) Diffusivity k for 12 in. Sp. heat × density**	**(5) Conductivity k for 1 in.**	**(6) k × sp. heat × density for 1 in.**
Expanding paper blanket ..	.349	1.6	0.55	0.046	.3	.165
Glasswool	.210	3.	.63	.036	.27	.17
Wood fibre blanket	.330	3.	.99	.023	.275	.27

Continued on next page

Appendix III (*Cont.*)

Rockwool	.201	6.	1.2	.019	.275	.327
Lead slagwool	.187	7.	1.3	.017	.265	.345
Vermiculite	.205	9.	1.8	.015	.32	.576
Glass wool binder	.196	12.	2.3	.011	.30	.69
Cork board	.417	8.	3.3	.0068	.27	.89
Hair felt	.334	11.	3.7	.0061	.27	1.0
85 per cent. Magnesia	.276	15.	4.1	.0086	.42	1.72
Corrugated asbestos paper	.245	17.	4.2	.0089	.44	1.85
Wood fibre board	.341	14.5	5.0	.0055	.33	1.65
Organic insulators	.33—.417					
Cork	.342	3½	1.2	.015	.22	2.64
Cork slab	.417	13.	5.4	.0057	.37	2.0
Slagwool	.17	9½	1.6	.016	.31	.496
Slagwool	.22	15.	3.3	.009	.35	1.15
Glasswool	.21	9.	1.9	.012	.28	.532
		5.	1.0	.018	.22	.22
Balsa wood	.35	6.	2.1	.015	.33	.7
Eel grass		4.6			.26	
Eel grass		9.4			.31	
Fibreboard	.35	14.5	5.0	.0057	.34	1.7
	.35	19.5	7.0	.0045	.38	2.66
Sawdust, dry		12.			.41	
Woodwool		25.			.45	
Asbestos sprayed 1⅞ in. thick and 0.1 in. cement	.196	11.2	2.2	.012	.32	.7
Asbestos slabs	.195	8.25	1.6	.019	.37	.59
Asbestos slabs	.195	4.0	.78	.035	.33	.26
Two outer sheets of ¼ in. or less thickness enclosing an air space divided by aluminium foil or by ½ in. fibreboard		gives equal heat resistance to 1 in. Grade A material of k=.3 and heat capacity would be about 3 lbs. per sq. ft.				
Grade B Insulators						
Woodwool	.3	30.	9.0	.0054	.58	5.22
Laminated board	.35	35.	12.1	.0037	.53	6.41
Paper pulp board	.35	38.	13.3	.0044	.53	7.05
Hardboard	.35	55 to 63	19.2 to 22.	.003 to .00375	.84 to .99	16 to 22
Diatomaceous earth, 60 deg. F.		30			.64	
Diatomite brick (400 deg. F.)					.725	
(1,400 deg. F.)					1.0	
Straw thatch	.33	8.	2.8	.023	.77	2.16
Deal	.35	38.	13.3	.0054	.87	11.57
Plywood	.35	33.	12.	.0066	.96	11.52
Pine, teak, walnut	.35	41 to 45	14.7	.0053	.96	14.1
Oak	.35	48.	16.8	.0053	1.11	18.65
Plasterboard	.23	60.	15.	.006	1.1	16.5
Dry pumice concrete	.25	43.	11.2	.0083	1.1	12.3
Pumice	.25	45.	11.2	.0083	1.1	12.3
Grade C Insulators						
Foam slag concrete, 1 : 2½ : 7½, 15 per cent. moisture	.27	65.	17.5	.007	1.5	26.25
Ditto, moist					2.2	
Clinker concrete	.27	95.	25.6	.007	2.3	50.9
Asbestos cement sheeting	.25	96.	24.	.008	1.9	45.6
Insulating brick (400 deg. F.)	.29	30.	7.2		1.74	
Insulating brick (1,400 deg. F.	.24	30.	7.2		2.17	
Cellular concrete						
Grade D Insulators						
Plaster	.2	88.	17.6	.019	4.	70.4
Water	1.	62.5	62.5	.0057	4.3	268.7
Sand	.2	103.	20.6	.016	4.	82.4
Firebrick, 1,100 deg. F.	.24	120.			4.06	
Grade E Insulators						
Ballast, 1 : 1.2	.27	146.	39.4	.014	6.7	264.
Glass	.161	157.	24.7	.024	7.3	183.
Firebrick		125.	32.	.02	7.4 (at 800 deg. F.)	237.
Brick	.195	110.	21.5	.031	8.	172.
Sandstone	.22	125.	27.5	.027	9.	247.5
Limestone	.22	136	30.	.029	10.6	320.
Marble	.21	170.	35.7	.04	17.4	621.
Coal	.278	170.	35.7	.04	17.4	621.
Coke	.201					
Metals						
Lead	.03	710.	21.3	.94	240	5,112
Steel	.1175	490.	57.5	.5	340	19,550
Cast iron	.127	450.	57.1	.53	363	20,730
Aluminium	.214	160.	34.2	3.4	1,408	46,153
Copper	.0928	530.	51.	4.3	2,650	135,150
Air	.24	.08	.0192		.017	
Water vapour	.42					

Appendix IV


RESISTANCE
TEMP DROP
ACTUAL TEMP
11" BRICK
INNER AIR
Inner air resistance .7 6·6 60°
INNER WALL SURFACE
½" plaster 53·5
4½" brick .56 5·2 47·2
2" air space 1·0 9·3 37·9
4½" brick .56 5·2 32·7
outer air resistance .3 2·7 30°
OUTER AIR
TOTAL R. 3·245
4½" BRICK + ½" FIBRE-BOARD ON BATTENS
INNER AIR
Inner air resistance .7 5·25 60°
INNER WALL SURFACE 54·75
½" fiber board 1·44 10·8 44·
½" air space 1·0 7·5 36·5
4½" brick .56 4·2 32·3
outer air resistance .3 2·25 30°
OUTER AIR
TOTAL R. 4·0
4½" BRICK, 2" GRADE "A" INSULATION, ¼" HARDBOARD
INNER AIR
Inner air resistance .7 2·5 60°
INNER WALL SURFACE 57·5
¼" hard board .26 1·0 56·5
2" grade 'A' (eg slagwool) 6·66 23·5 33
4½" brick .56 2·0 31
outer air resistance .3 1·0 30
OUTER AIR
TOTAL R. 8·48
WINDOW OR SINGLE METAL SHEET LINING.
INNER AIR 60°
Inner air resistance 7 21·
INNER SHEET SURFACE 39
metal sheet or glass 0·0 0
outer air resistance ·3 9
OUTER AIR 30°
TOTAL R. 1·0
22 GAUGE C·I SHEET + 3 PLY LINING ON FRAME
INNER AIR 60°
Inner air resistance 7 9·6
INNER SURFACE 50·4
⅜ 6 threeply 2 2·7 47·7
3" air space 1·0 13·6 34·1
22 gauge c. i. sheet 0·0 0·0
outer air resistance ·3 4·1
OUTER AIR 30°
TOTAL R. 2·2
¼" A·C SHEET, 3½ GRADE 'A' ¼" PLASTER BD ON FRAME
INNER AIR 60°
Inner air resistance ·1 1·5
INNER SURFACE 58·5
¼" plasterboard ¼ ·23 5 58
3½" grade 'A' (eg slagwool) 11·66 27·0 31·
⅛" A.C. sheet ·13 ·3 30·7
outer air resistance ·3 ·7 30
OUTER AIR
TOTAL R. 13·02

AXONOMETRY

By JOHN H. MARKHAM [*F.*]

Buildings are frequently illustrated in a form of oblique projection which is described as "axonometric." The descriptive adjective (derived from two Greek words meaning "axis" and "measure") is by no means self-explanatory, and it is not always very consistently used. It occurred to me that it would be of interest to ascertain how, when and by whom the word was coined; and I now give the best answer I have been able to obtain. It would appear that the word originated with mathematicians and derives its peculiar form from mathematical ideas.

The word "axonometry" (whence the adjective "axonometric") first appeared in the English language—according to the Oxford Dictionary—when Mr. W. J. Jardine, one of the founders of the London Mathematical Society, presented to that body a paper entitled "An account of Schwarz's proof of Pohlke's fundamental proposition of axonometry." This was in the year 1865.

Mr. Jardine's paper was not published; but it may be assumed that he reproduced the treatise by H. Schwarz which appeared in the *Journal für die reine und angewandte Mathematik* of A. L. Crelle (63 Band, Berlin 1864) under the title "Elementarer Beweis des Pohlkeschen Fundementalsatzes der Axonometrie." The same article, with only slight modifications, is to be found in the "Gesammelte Mathematische Abhandlungen" of H. A. Schwarz (Zweiter Band, Berlin, 1890). In this article earlier work done by von Deschwanden in 1861 is referred to.

I have not been able to consult Pohlke's work, but I suppose he coined the word "axonometrie." In Schwarz's article is a statement which may be translated as follows:

"About the year 1853 Prof. Pohlke enunciated and proved the theorem that three lines of any given lengths, in one plane, radiating from a point and making different angles with one another may always be regarded as an (inclined) parallel projection of three lines of the same length perpendicular to one another."

It appears that Pohlke did not publish his own statement till 1860. The paragraph quoted above does not contain the word "axonometrie"; but the title of Schwarz's article does, and that in a way that seems to own Pohlke as the originator of the basic theorem on the subject. The article in question is in form algebraic and trigonometrical rather than geometrical. In the "Zeitschrift für Mathematik und Physik" (Schlömilch, Kahl und Cantor), 21 Jahrgang 1876, Guido Hauck states that the origin of "axonometrie" attaches to the names of Weisbach and Pohlke. Weisbach has an article on "Die monodimetrische und anisometrische Projections-Methode" in the "Polytechnischen Mittheilungen" of Volz and Karmach, Tubingen, 1844.

Appendix IV (left hand col.) Notes

Total Resistance $= \frac{1}{U} = \frac{1}{f_i} + \frac{L1}{k1} + \frac{L2}{k2} + \frac{L}{f_o} = 0.7 + .2 + 1.0 + 0.3 = 2.23$ and $U = \frac{1}{2.2} = .45$ B.Th.U.

Heat Gradients in walls after a steady state is reached are indicated in the above examples.

They show that (1) the inner surface temperature of a wall may be 58.4° if well insulated, and of a window only 39° with inside and outside air at 60° and 30°.

If the dew point is between 58 and 39° condensation would occur on the window but not on the wall.

(2) Inner and outer air surface resistances combined equal a closed air space in insulating value, *i.e.* 3/10th in. Grade A: these resistances are important with the sheeting, but relatively unimportant with good insulation.

(3) Note the difference by replacing the air space in (5) with 3½ in. Grade A in (6).

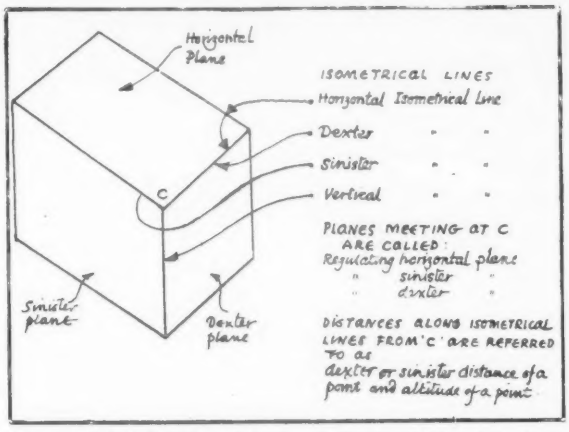
(4) 1/16th in. iron sheet (k = 360) has resistance = 0.00018 B.Th.U. ¼ in. plasterboard (k = 1.1) has resistance = 0.23.

The heat resistance of any thin sheet if k exceeds 2, is too small to affect insulation, unless combined with an air space.

In some articles on the subject reference is made to the work of a French geometrician named Desargues (1593-1662) who was a contemporary of Descartes. His contribution to the subject of geometrical drawing may be seen in "Œuvres de Desargues—réunies et analysées par M. Poudra" (2 vol., Paris, 1876). Desargues develops a method of perspective drawing, without using vanishing points, that was sharply criticised at the time and gave rise to controversy amongst those interested in the subject. He made use of nomenclature and phraseology that seems curious and picturesque to present-day readers, but I cannot see that he has anywhere employed the word "axonometrie."

There is scope for a historical treatise on perspective drawing. Miss G. R. Levy has contributed an attractive approach to the subject in a paper entitled "The Greek Discovery of Perspective: its Influence on Renaissance and Modern Art," which appeared in the JOURNAL for January, 1943. The subject is treated from a philosophical point of view rather than as an exact science; but this is perhaps inevitable, and even desirable, in dealing with the earliest impacts of science on pictorial art. It may be remarked that the systems of oblique projection, which are the subject of the present note, were at first regarded as special forms of perspective representation. Isometric projection was, when it first appeared, described as perspective drawing in which the spectator is considered to be situated at an infinite distance from the object. Anyone who undertakes the task of writing the history will find exhaustive bibliographies in a long treatise by E. Papperitz, entitled "Darstellende Geometrie" in the "Encyklopädie der Mathematischen Wissenschaften" (III.AB.6, p. 573), and in the "Enciclopedia Universal ilustrada" (Barcelona), Tomo XLIII, p. 1192. In Gehler's "Physicalisches Wörterbuch" (7ter Band 1 er Ab:) is an article entitled "Geschichte der Perspective" beginning with the statement taken from Vitruvius that Agatharchus in the days of Aeschyllus had a system of perspective for theatre scenery.

The word "axonometrie" is used in a general sense to include all forms of parallel ray projection on to a plane inclined to the principal planes of the object, and in that sense includes isometric projection as a special case. The "Larousse du XXe Siècle" under the word "axonométrique" says: "Perspective Axonométrique—Projection orthogonale sur un plan oblique aux trois dimensions du corps à représenter. Les axes de la perspective sont les arêtes du trièdre trirectangle déterminé par les trois directions." "La Grande Encyclopédie inventaire raisonné des Sciences des lettres et des Arts" published in Paris (no date given) has a longer description and divides the general group of projections of this kind into the sub-classes of "anisométrique," "monodimétrique," and "isométrique."



The "Traité de Géométrie descriptive" of Jules de la Gournerie (3rd edition, 1891) uses the word "axonométrique" to include all types of projection on inclined planes and subdivides into "anisométrique," when the three principal planes (or axes) of the object are all differently inclined in relation to the plane of projection, and "monodimétrique" when two principal faces have the same inclination to the projection plane. The projection is "isométrique" when the plane of projection is equally inclined to all the principal planes. He further describes "perspective cavalière" as an oblique projection made on a plane vertical and parallel to one of the two principal vertical planes of the object.

Isometric projection was introduced by Prof. Farish and first explained in the first volume of the Transactions of the Cambridge Philosophical Society, 1822. In 1834 T. Sopwith published a "Treatise on Isometrical Drawing" in which he recognises the system as originating with Prof. Farish. He refers also to an article by Nicholson in Rees' Cyclopædia (1813) and informs us that Nicholson invented the centrolinead for which he received twenty guineas and a silver medal from the Society of Arts in 1814.

Prof. Farish adopts a nomenclature that is quite interesting and useful. It is explained in the accompanying figure.

In the article on "Perspective" in Gehler's "Physicalisches Wörterbuch" (7ter Band, 1er Abt: N-Pn), Leipzig, 1833, reference is made to "Isometrische oder isoperimetrische Perspective," and Prof. Farish is recognised as the inventor.

TWO R.E. ARCHITECTS AT WAR

We have received these two interesting accounts of the life that two members of the R.I.B.A., in the R.E.s, Capt. C. W. R. Corfield and Lt. F. H. Carr, are experiencing in Persia and Assam.

The note on Capt. Corfield's work has been received from the Ministry of Information. Lt. Carr's experiences are told in extracts from letters home.

THE EAST PERSIA ROUTE FROM INDIA TO THE U.S.S.R.

Captain C. W. R. Corfield, of Falmouth, a young officer of the Royal Engineers, was one of half a dozen officers who supervised the building of a new road from India to the U.S.S.R. which is now the East Persia Route. The road was originally a centuries-old caravan way. Along it lorries from India are rumbling into Russia with war supplies.

In place of the rough track trodden into the sand by the feet of countless camels a broad motor highway has been laid over 600 miles of an 800-miles desert and mountain road. It has been entirely hand-made by thousands of peasant workmen—no machinery was available.

Capt. Corfield's duties included surveying and planning. His knowledge of French and Persian, which he studied before undertaking the work, enabled him to facilitate liaison between the various foreign contracting firms and was also of considerable value in enlisting peasant labourers.

Construction of the East Persia route was completed in eight months, an average of three miles a day. It was a rush job necessitated by the German advance on the Caucasus. The work was done by a pick-and-shovel army of 30,000 men, woman and children.

River beds were paved, drains were laid, and hundreds of

bridges were built. Water and food for men and beasts were taken hundreds of miles by camel as the road was pushed forward.

" We recruited the workpeople from the towns and villages," said Capt. Corfield, who is now in Delhi. " In spite of all the odd nationalities and the widely differing engineering practices of the four foreign contracting firms, everyone got along fine. We had Greeks, Yugo-Slavs, Belgians, Russians, Turks, Italians, Bulgars and Rumanians, not to mention the Persians who did most of the labouring. The contractors' representatives were a Dane, a Czech, a Norwegian and an Austrian. During the winter one of our greatest difficulties was getting the labourers to work, because of the intense cold. Up to three feet of snow had to be cleared in the mountains, and a bitter north wind was blowing all the time. In the summer the temperature reached 130 degrees, which made us stop work until the late afternoon."

Capt. Corfield has written a private report, illustrated with his own photographs, which is being studied by senior officers at G.H.Q., India.

The road is complementary to the West Persia routes for British and American supplies. It is India's outstretched hand to Russia's southern frontier.

" The quantity of supplies—jute, rubber, hessian, copper, tin and mercury—that India can send to Russia is limited only by the transport facilities available," said an Indian representative of one of the supply organisations. " Already many lorries, mostly provided by India, are employed to full capacity. We expect a substantial increase in the present number shortly."

Mountain passes had to be widened and in one valley eight miles of roadway were laid with 12-feet protection ditches to direct flood waters. Houses had to be built to fulfil contracts that a workman should not have more than a four-mile walk to his work.

A host of unexpected difficulties, such as graft and profiteering by civilian merchants, had to be surmounted. More than £400 was paid for an urgently needed tyre and £40 for a car battery.

R.E. Works in Assam

Journey's end at last ! I am up in north-east Assam at about the junction of Burma, Tibet, and China, surrounded on three sides by mountains.

We had a very tedious journey up from Calcutta. There were nine of us, and when we changed on to the narrow gauge railway the confusion at the station was indescribable—what with the baggage, the darkness, not knowing the language, and the fact that Movement Control had omitted to make reservations on the new train. However, after much shouting we managed to find accommodation and spent a very uncomfortable night. Next day we had to get out of the train and cross the Bramaputra by ferry. On the other side we were met by car and taken to a camp for final posting. After a very good meal in the Officers' Mess we were interviewed and eight of us pushed off the same night by train. At 10 p.m. the following evening we arrived at some outlandish junction where we received a message that we were to spend the night on the station. I came on here by road.

To-day we started work. Got up at 6 a.m. and was back at 6.15 p.m.—rather a long day, you'll agree, and I'm feeling a bit tired. I am staying with the Garrison Engineer who, by the way, is a civilian. However, he knows the ropes, having been out in these parts for 15 years. There is no doubt about it, the country here is lovely. It is right in the middle of the tea-growing area, and the tea bushes are most lovely bright green. There is plenty of grass and nearby is the jungle. Coming up in the train we came through great stretches of virgin jungle with lovely deep red flowering creeper and all the tangled undergrowth one reads about. The tea planters do themselves well as regards living accommodation, and I am staying in one of their bungalows, perched about 10 ft. in the air on stilts. Strange to say they are genuine half-timbered constructions and would rejoice the souls of all Tudor minded people in England. The beams are black and the rest of the walls distempered white, both internally and externally. The roofs for the most part are thatched and I must say the general effect is very pleasing. The rooms are large and lofty, usually with lounge, dining-room, two bedrooms with a bathroom to each, and servants' quarters outside. The rainfall in these parts is one of the heaviest in the world and wild animals abound—tigers, leopards, elephants, rhino, etc.

The hours of work here are long. I am out on my feet all day, and it is getting very hot and trying at times. I am superintending, or trying to superintend, as well as ignorance of both language and local conditions will permit, the laying of vast areas of concrete. The labour is entirely Indian—hordes of them, shouting, pushing, and being pushed. They work the concrete mixers and, when the concrete emerges from the mixer, they often give a great shout in chorus as if they had given birth to twins ! I sometimes feel like an Egyptian taskmaster building a vast pyramid in ancient times, and if the Israelites were as difficult as these Indians I should have a good deal of sympathy for the taskmaster ! However, it has its lighter side. Yesterday there was some excitement on the job. All the fighters took off suddenly, and the coolies, thinking there would be an air raid, all ran away—3,000 of them—in double quick time. It took about two hours to get them back to work. It is uphill and discouraging work at times. To-morrow is the favourite word of the Indians, while the Americans cannot understand why everything isn't supplied immediately. The tea planters are very pleasant and helpful. They are very interested in affairs at home—air raids, the food question, rationing, etc., and seem to think things are much worse than they are. Most of them have been here for 15 to 20 years, but the life, as they knew it in normal times, has all Gone With the Wind !

I see that Churchill, in his last speech, referred to our modest activities out here. I wonder if you will be able to spot the short paragraph in question. We are very busy here and looked upon by the " high-ups " as the blue-eyed boys for getting things done. When they come down they always seem very satisfied with our efforts, although if buildings were as complicated here as in England, it would be well nigh hopeless. One day I shall be able to tell you about it, but just for now you will have to guess. I can tell you this much. The Americans are doing a wonderful job of work. It is a great problem with the Chinese. I try speaking to them in Hindustani or English. The universal word that all understand, however, is O.K., but it doesn't make conversation very interesting ! In the trains, a load of Chinese in the truck was quite useful as they could extricate the vehicle when it got bogged. In spite of their many misfortunes, they seem a cheerful race and almost ageless in appearance. Armed with a revolver, we go bumping over bad, narrow roads, ploughing through mud and water, getting stuck, and getting out again. Yesterday we ran into a terrific storm. It was impossible to see anything. The truck plunged into a pothole filled with water and I thought we were never coming up again. In fact, I felt I was as good as in the Navy ! As we emerged on the other side the engine conked out with water in the petrol so the feed pipes had to be blown through. But we take no notice of this sort of thing out here, and if the truck slips off the road into a ditch there are always willing hands to haul you back again.

. . . My leave has just started. We got off, as arranged, for our expedition up the big river. We have three boats which are well filled with our kit and nine boatmen, in addition to the cook and bearer. The boats are about 18 ft. long and hollowed out of tree trunks—all very primitive but the men handle them very skilfully. The country is lovely with snow-capped mountains in the background, and the river clear and greenish-blue in colour. In the rains it is a raging flood but now, except for rapids, is quiet and peaceful. The river banks are of silver grey fine sand, which looks like snow in the moonlight, and it is on the sand that we camp. Behind is dense jungle cut into by the various creeks. There

are tracks of deer, leopard, and buffalo. One of us saw a tiger yesterday and organised a great hunt, but it did not reappear. It is astonishing what little one sees, but I have the feeling of being watched by unseen eyes. Last night we tried moonlight shooting and came upon a fine stag. It makes one realise what patience and time is required to secure the animal films we take so lightly at home. This is supposed to be one of the finest game counties in India. This is our second camping place and we are slowly making our way back. The sunsets are gorgeous—with the purple mountains, black jungle, and the river old gold, silver, and purple. At night we have a great log fire and go to bed early. There does not seem to be anything very strange or unusual about this sort of existence. I am becoming a great fisherman on this trip. One day I caught an eighteen-pounder, which gave me a bit of a tussle, but the climax came with a twenty-pounder, which felt like the bed of the river coming up ! The total catch of the day was 66 lbs., so my prestige with the boatmen was very high, especially as my companion had caught nothing.

. . . Back on the job again. This place is about as remote as could be, yet one often comes across another architect and discovers some mutual acquaintance. There seem to be quite a number of officers out here with children they have never seen. It promotes a great fellow feeling. We get together and compare snapshots—and even weights and teething troubles, just like a lot of old women ! So far, nobody else seems to have acquired twins ! There is always the mail to look forward to. The R.I.B.A. JOURNALS have been arriving regularly and help one to keep in touch. There seems to be a lot doing about post-war planning. I am speaking for all us poor exiles when I say that we hope to get back in time to have a hand in it.

SMOKE REDUCTION IN THE DOMESTIC OPEN FIRE

A Note on Some Experiments at the Fuel Research Station of the Department of Scientific and Industrial Research

By R. H. ROWSE, B.Sc., F.Inst.P.

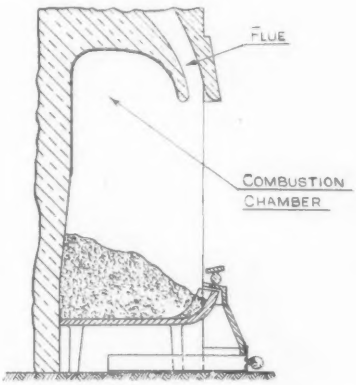
Each year the domestic chimneys of Great Britain pour nearly a million tons of smoke and large volumes of sulphur-dioxide into the atmosphere. This accounts for about half of the total atmospheric pollution ; the remainder originates in industrial premises. . The unnecessary loss inflicted on the community, both in health and materials, is very great.

Sulphur-dioxide is formed from the sulphur present in coal. It cannot be eliminated by altering the design of domestic appliances, but its amount can be reduced to some extent by removing as much as possible of the sulphur from the coal before it is burned. This can be done by cleaning the coal, and in fact, immediately before the war, about half of the coal produced was treated in this way.

Smoke is formed when coal is incompletely burned, and a considerable reduction in smoke can be obtained by altering the design of the appliance so as to improve the conditions under which the coal is burned.

When a piece of coal is put on the fire a yellowish brown tarry smoke is first given off ; when this bursts into flame a black smoke consisting of carbon particles may be produced. The smoke given off from coal burning in open domestic grates contains about equal parts of tarry matter and carbon particles ; both kinds of smoke are combustible, but the conditions in domestic heating appliances are such that the smoke is not usually completely burnt.

In order that the smoke may be completely burnt, there must be intimate mixing of the smoke and air necessary for combustion at a sufficiently high temperature. Such conditions can be more nearly obtained in industrial plant than in domestic appliances, and, in fact, the smoke emitted from such plant is proportionately much less than that given off by domestic heating appliances. Many arrangements have been proposed for the reduction of smoke from domestic coal-burning appliances, but none has found favour with the public. Some do not fulfil the requirements of the mixing of smoke and air and a sufficiently high temperature. Others, though possibly effective to some extent in reducing smoke, have not been adopted as they do not show certain characteristics essential to domestic fuel-burning appliances. These characteristics are ease and simplicity of operation, robustness of structure, simplicity of design and ability to work under all the diverse conditions to which such appliances may be subjected. Ease and simplicity of operation are essential because there is very little direct incentive to the individual householder to burn coal smokelessly ; in fact, any arrangement should be such that it needs no manipulation whatever. Robustness and simplicity of construction are obvious essentials ; in particular, moving parts should generally be avoided. Peculiar structural features should not be required in the building, in which the appliance is to be installed. The application of a smoke-reducing device to any appliance should not make the appliance less effective in fulfilling the duties which it has to perform, neither should it detract from its appearance. The need for an arrangement which will be effective under all the conditions to which it may be subjected is of great importance, for experiments have shown that some arrangements which produce considerable diminution of smoke under certain conditions, may, under other conditions, increase it.



One impediment in the past to the development of smoke-reducing appliances has been the lack of suitable measuring facilities. The measurement of smoke emission requires somewhat elaborate apparatus, and it was not until such facilities were provided and the necessary technique was developed at the Fuel Research Station of the Department of Scientific and Industrial Research a few years before the War, that any real progress was possible.

As a result of the work carried out at the Fuel Research Station an arrangement* for reducing the emission of smoke from domestic coal-burning appliances reached an advanced stage of development. The work was interrupted at the outbreak of war, and there has been no opportunity as yet to continue it. Although the investigations were at the time confined to open grates, there is good reason to believe that the arrangement would be equally applicable to other domestic solid fuel-burning appliances.

In an appliance to which the arrangement is applied the fire-brick back rises from the level of the fire-bars, and at a suitable height above the fire-bed the fire-brick structure is turned out roughly at right angles towards the front, thus forming a roof which extends almost to the outer edge of the appliance ; the outer edge of the roof is turned downwards a few inches, thus forming a kind of open combustion chamber. Figure 1 shows an application of this arrangement to the open fireplace. The partially burnt smoke-laden gases rise from the fire-bed and pass into the combustion chamber, where, by virtue of its shape, they are intimately mixed with the air required for combustion at a temperature sufficiently high to ensure that they ignite and burn. The gases pass out under the front of the combustion chamber and thence into the flue. The combustion chamber is kept hot both by the gases burning in it and by the heat radiated to it from the hot fuel in the grate.

Although the device is designed to reduce the amount of smoke given off by coal when burned in domestic appliances, it should not in any way reduce the efficiency of the appliance when smokeless fuels are used. The arrangement is robust, it requires no operation, manipulation, or attention, and it has no moving parts which may go out of order, or ducts which may become clogged.

The weight of smoke given off from an ordinary open fire varies in general between 1 and 3 per cent. of that of the coal, the actual quantity depending upon many factors, such as the quality and size of the coal, the method of refuelling, the intensity of the fire, the design of the grate, and the time for which the fire has been in use.

In a grate fitted as described, the amount of smoke produced varies between ½ and 1 per cent. of the weight of fuel burned. Because of the many variable factors already mentioned, it is not possible to give in precise terms the amount by which smoke is reduced by using this, or, in fact, by using any smoke-reducing arrangement. Comparative tests however, show that with the device in its present state of development the reduction in smoke emission is up to 50 per cent., or sometimes more.

The extended use of the arrangement which has been described would considerably reduce the large amount of smoke given off from domestic coal-burning appliances, and so contribute to the reduction of atmospheric pollution.

The investigation mentioned in this article was undertaken at the Fuel Research Station of the Department of Scientific and Industrial Research with the financial co-operation of the British Coal Utilisation Research Association and the London County Council. Much of the work was carried out under the general guidance of an advisory committee, including representatives of the Fuel Research Station, the British Coal Utilisation Research Association, and the Coal Utilisation Council.

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* British Patent 531,748.

Fuel Research Station, Greenwich, S.E.10.

May, 1944.

Book Reviews

The Architectonic City in the Americas: Significant Forms, Origins and Prospects. By Hugo Leipziger. 4to. 68 pp. 40 plates. University of Texas Publication, No. 4407. 1944.

No reasonable person will be disposed to quarrel with Mr. Leipziger when, in summing up the main thesis of his essay, he says: "Any attempt to divorce our own work from the Great Tradition of architecture and philosophy must necessarily result in unintelligibility." Unfortunately for the intelligibility of his ideas, however, he himself seems to belong to the Humpty-Dumpty tradition of philosophy, according to which, one may recall, words mean what the author chooses them to mean. If, therefore, this account does less than justice to Mr. Leipziger's essay, the excuse must be that his work conforms so strictly to the Humpty-Dumptian Principle of Impenetrability. Somehow it seems to fill one's head with ideas, only, like Alice, one doesn't exactly know what they are.

At the outset we are told that "it is with the end of evolutionary progress in mind that this attempt is made to interpret forms and values of architectonic importance." The direction in which this "evolutionary progress" is foreseen may be gathered from the statement that "it is the imaginative application" of a "sense of reality to political affairs, science, and economics which has given world leadership to the Americas," and from the conclusion that "as a manifestation and symbolic representation of contemporary socio-cultural trends, a significant architecture is not only of extraordinary importance for the Americas, but it also affords symbolic functions for the cultural co-operation of East and West." Mr. Leipziger admits that it will be necessary to restrict the argument "to a very few important phases of historic and contemporary architecture in order to steer our premises toward" such a general conclusion; and in this remarkable process of navigation we are therefore conducted from American colonial architecture to that of the pre-Columbian civilisations of Central America, and thence back to modern America by way of Classical Greece and thirteenth-century Europe, with fleeting glances at China and India on the way, all in the space of forty odd pages.

Eight pages are devoted to a discussion of pre-Columbian architecture, about which one would have been glad to have some information. The precise results of a reading of this section may be summarised in the author's own words. To the question "On what does the high quality of pre-Columbian architecture depend," he replies: "We must confess that we find ourselves at a crucial point and without any satisfactory answer." It is a question which depends on our growing faculty to understand and correlate the deeper roots of life. The complex problem remains still in the category of "unknown quantities." He therefore proceeds to an account of European architecture and the philosophy from which it has sprung, in which the names of Plato, Aristotle, Hippocrates, Hippodamus, St. Thomas Aquinas, and others are employed to support his ideas, without, however, any very strict regard to their own. In the course of this account we are introduced to Mr. Leipziger's theory of what he calls "ideational" architecture as distinct from the more normal visual variety, fifth-century Greek and thirteenth-century Gothic work being distinguished as "ideational." It is a pity that the Greeks had no word for what they are credited with inventing. At least it might have saved Mr. Leipziger from having to resort to so blatant a barbarism in order to explain his ideas.

In fairness to Mr. Leipziger, it should be said that his vagueness and verbosity are not particular to himself, but are representative of a growing class of literature dealing with architecture, and, especially with what it is fashionable to call "planning"; and that, in spite of all, he does seem to have got hold of two very important ideas. One is the value for architects of the study of philosophy, or, to speak more simply, of learning to think. This cannot be done, however, by skimming the top off a large assortment of philosophical works, especially at second hand. As Mr. Leipziger says in his preface, "Short-cut methods will be of no avail as far as qualitative results are concerned." The other is the need, which he so rightly stresses, for us to recapture, in the twentieth century, a sense of architectural language, or symbolism. To this end the study of actual buildings by careful measurement and drawing, or, if that is impossible, by means of carefully selected photographs and plans, is essential; but here, again, Mr. Leipziger's book unfortunately falls a long way short of what one would have wished. His forty plates, containing a hundred and sixty-eight separate photographs and plans, are presented as uncritically and inconsequentially as his quotations from the philosophers. Many of the plans are shown without scales, and most of them are too small for serious study. They are, likewise, for the most part, devoid of such descriptive notes as might have made up for the lack of information in the text, on such matters as the purpose of particular groups of buildings, the method of their construction, and the meaning of their symbolism. The symbolism of pre-Columbian architecture alone might have provided ample material for a fascinating study. As it is, however, Mr. Leipziger's habit of referring, in the text, to half-a-dozen illustrations at once, gives the impression that there is nothing he really wants to tell us about any of them.

W. A. Eden [*F.*].

Post-War Building Studies

No. 4.—**Plumbing** by the Plumbing Committee of the B.R.S. of the D.S.I.R.

No. 5.—**The Painting of Buildings** by a Committee convened by the Paint Research Association.

No. 9.—**Mechanical Installations** by a Committee convened by the Institution of Mechanical Engineers.

No. 13.—**Non-ferrous Metals** by a Committee convened by the British Non-ferrous Metals Research Association.

These four reports compose the second batch of Post-War Building Studies. The first group consisted of No. 1, The Burt Committee's report on House Construction; No. 2, on Standard Construction for Schools; No. 3, on Plastics; and No. 4 on Gas Installations.

The Plumbing Committee define their task as the improvement of the efficiency of plumbing in this country. They show how advantage may be taken of present opportunities to improve the technical efficiency of installations, to secure uniformity of practice, to extend standardisation, and to promote economy in construction. They note that British plumbing has been based almost entirely on a basis of practice, and suffers from lack of research. The last chapter of the report is a statement of recommendations for further investigation.

The presentation of the report is positive and simple. Under each heading a number of recommendations are stated briefly, with subsequent enlargement or explanation. The main headings are as follows: *Lay-Out of Installations*; water supply, exclusion of foul air, precautions against vermin, safeguards against boiler explosions, frost precautions, efficiency from the standpoint of the user, precautions against noise,

appearance, corrosion, economy. *Use of Materials :* Durability, noise prevention, insulating materials, etc. *Standard Appliances :* Baths, sinks, etc. The desirable design characteristics, dimensions, traps, etc., of each fitting are stated. *Note on Building, Drainage,* and, finally, *Recommendations for Further Research and Investigation.* In both text and illustration particular attention is given to the use of a one-pipe system in small house plumbing. The report is an invaluable handbook for practising architects, despite its admittedly " interim " nature.

The PAINTING REPORT is introduced by a general chapter on the nature of paint, but otherwise consists mainly of recommendations, first for the preparation of surfaces, and next of paint specifications for all types of work, new surfaces and old, wood, metal, stone, brick, etc. The types of paints recommended are defined as oil paints, water paints, varnishes, and miscellaneous (metal and plastic paints, etc.), and under each main head specific types are described. Concluding sections deal with the immediate post-war problem and the quality and quantity of paints available and with painting economies. Appendices deal with building cleaning with water; protective treatment of steel windows ; the removal of anti-scatter and black-out treatments from glass ; common causes of paint failure, and " paint harling " for steel-clad houses.

The NON-FERROUS METALS REPORT covers the use in buildings of aluminium, copper, lead, magnesium, nickel, stainless steel, and zinc and their alloys. The first section deals with properties, corrosion resistance, and methods of working and jointing. The second part gives recommendations for specific uses in piping, tanks, sinks, and baths, etc., fittings, roofing, guttering, damp courses, for structural purposes, and as heat insulation. The penetration of non-ferrous metals into every side of building work, structural and decorative, and as equipment has been in progress for a considerable time, but this report is the first comprehensive study which presents the opportunities and problems in any degree of perspective, and free from the polemics of the market.

The Committee on MECHANICAL INSTALLATIONS had as their terms of reference to review and collate existing knowledge here and abroad on the science and practice of mechanical installations in buildings ; to make recommendations for practice both for the immediate and long-term post-war period, and to suggest lines for research and development of mechanical appliances. With this vast task, the Committee subdivided their work among sub-committees on (*a*) Lifts, hoists and escalators ; (*b*) Cooking installations, laundry appliances and refuse-disposal systems ; (*c*) Heating, ventilating, and air-conditioning, etc. ; (*d*) Wells, bore-holes, fire-fighting, etc. ; (*e*) Building, power-plant ; and (*f*) Refrigeration.

Furthermore, they ordered their work so that the equipment for the most urgently needed building types should have priority.

The present report deals with all the items of equipment listed, and in each case discusses the needs and possibilities, and makes recommendations for houses and flats and schools as the first priority task. All sections include much planning information, as well as analyses and recommendations on the purely mechanical design of equipment.

All four reports are clear in their statement, excellently presented, and full of information that no architect can well afford to miss. There are copies in the loan and reference libraries.

Beautiful Norfolk Buildings. Sketches by Stanley J. Wearing [*F.*] 8vo. 54 pp. 44 plates. The Soman-Wherry Press, Ltd., Norwich, 1944.

Mr. Stanley J. Wearing's recent publication, *Beautiful Norfolk Buildings*, modest withal, is an intimate appeal to all lovers of that county, and offers an especial attraction to those interested in the essentially national and regional characteristics of our arts.

His excellent, well-rendered and conscientious drawings of these fine structures, in conjunction with the interest sustained in the text and the happy selection of subject, often from the by-ways, combine to produce a work worthy of this countryside, and of the author, and one that will give pleasure to many.

Mr. Wearing has absorbed the cultural traditions and genius of the East Anglian folk, associated with the mediæval and later craftsmen, as well as that of the Norfolk School of painters, and has interpreted them in an admirable and individual manner, which is no mean achievement.

In his earlier valuable essay, *Georgian Norwich—Its Builders,* Mr. Wearing illustrated the results of his diligent research through the files of the *Norwich Mercury,* by means of excellent photography, but his own drawings give a personal character and added charm to his latest work, and are further evidence of his erudition and enthusiasm.

Many serving abroad or at home would welcome a copy of this delightful little volume. J. L. D.

Complete Law of Town and Country Planning and the Restrictions of Ribbon Development. 1st supplement to 2nd Edition by H. A. Hill. M.A., Barrister-at-Law. 8 vo. 93 pp. Butterworth. 1944. Main work and supplt., 33s. Supplt. only, 10s. 6d.

The work completes *Hill's Law of Town and Country Planning* up to 31 May 1944, and includes, in addition to the Acts annotated in the main work, the Minister of Town and Country Planning Act, 1943 ; the Town and Country Planning (Interim Development) Act, 1943, and the Restriction of Ribbon Development (Temporary Development) Act, 1943. The first of these Acts, it is interesting to note at this moment, resulted in the establishment of a Ministry presided over by a Minister charged with the duty " of securing consistency and continuity in the framing and execution of a national policy with respect to the use and development of land throughout England and Wales."

The arrangement follows that of the original work except that a summary of the Law of Town and Country Planning replaces the previous summary of the Act of 1932. Also the " observations " on the 1932 Act have been replaced by observations dealing with a planning scheme as an example of delegated legislation, the quasi-judicial functions of the Minister, and other matters of practical and topical interest.

An important concluding section includes in full all the six circulars issued by the Ministry.

Accessions to the Library

1943-44—IV

Owing to the urgent need to economise space this list now records only new publications, excepting old publications having reference to current demands, e.g. on planning and topography. The others are summarised at end under " Older Works."

For economy of space the following also are now generally excluded from the list : (1) Year-books, lists of members, &c. ; (2) extracts from periodicals, and reprints of periodical articles already noted in the REVIEW OF PERIODICALS ; *(3) Government leaflets of slight or transitory interest. Full particulars are available in the library.*

Books presented by the publishers for review marked R.
Books purchased marked P.
**Books of which there is at least one copy in the Loan Library.*

ARCHITECTURE

HISTORY

FORTESCUE (G. ALAN), *illus.* 72.03 (42.565).064
Our heritage. A further selection from a Bedfordshire sketchbook Drawings by G. A— F—. Notes by " Touchstone."
7¾″. 67 pp. n.p. : Bedfordshire Times. 1943. 2s. 6d.
Presented by the Illustrator [*F.*].

(work) 72.03 (45)

BARUCCI (GALILEO) shelved (vol.) 72.034 (45)
Cenni storico-artistici di architettura antica e moderna.
Parte iii. [Rinascimento.]
12¼″. 72 pp. [Turin : Paravia. 1940.]
Presented by Mr. Gerald Nodes [*A.*].

GRINNELL (ISABEL H.) 72.032.8 (37/38) : 726.1
*Greek temples. ([New York :] Metropolitan Museum of Art.)
13¾″. xxi + 61 pp. + liv pls. (backed). New York. 1943. ($7.50, £2.) R. & P.

INDIA SOCIETY 72.036.6 (54)
Indian Art and Letters, *journal.* N.S., xvi, 2 : 1942, second issue. *Containing* ESCH (V. J.), Examples of modern Indian architecture, mainly in Hyderabad State.
11″. Lond. 1942. 5s.
Presented by the author of the article, C.V.O. [*F.*].

ARCHITECTURAL VOCATION ; PROFESSIONAL PRACTICE

Inf. file 72.07 : 354

MINISTRY OF WAR TRANSPORT + 62 : 354
Appointment of consulting engineers and architects. (Circular No. 582.) [Agreements.]
pam. 9¾″. Lond. 1944. R. (2).

BUILDINGS COLLECTIVELY ; PLANNING

MELIS (ARMANDO) 72.094 : 72.012
Caratteri degli edifici. Distribuzione, proporzionamento, organizzazione degli edifici tipici. Schemi funzionali.
2nd ed. 10¾″. viii + 354 pp. Turin : Editrici Libraria Italiana. 1943.
Presented by Mr. Gerald Nodes [*A.*].

BUILDING TYPES

(CIVIL)

697 : 662.5/9 binder

MINISTRY OF FUEL AND POWER: DOMESTIC FUEL PLANNING COMMITTEE

Domestic fuel memos.:

725.5 [697 : 662.5/9

P 3/12. Fuel economy in hospitals and institutions.

725.74 + 725.196] 697 : 662.5/9

P 3/13. F— e— in public baths and wash houses.

pam. & leaflet. 8¼″ × 6½″. Lond. 1944. R.

AKADEMIIA ARKHITEKTURY S.S.S.R. 725.92 : 69.033 V

Sborno-razbornye doma sistemy VBG [demountable hutments, system V.B.G.]. [By] V. I. Vinner [and] P. S. Belits-Geiman. [I. G. Sushkevich, ed.]

9¾″. 56 pp. Moscow: Gosudarstvennoe Arkhitekturnoe Izdatel'stvo Akademii *&c.* 1942.

Presented by Mr. Wright Miller.

(EDUCATIONAL)

GRIFFIN & TATLOCK, *Ltd.* 727.5 : 729.9

*Laboratory furniture. Catalogue number 15 B—LF, *cover title.*

10¾″. 24 pp. [Lond., &c. 1944.]

Presented by the firm (3).

(DOMESTIC)

× MS.

EARLY (ELEANOR M.) 728 : 649

Housing old people. (Thesis awarded distinction, Dec.)

typescript, *D.* & *Ph.* 13½″. 1943.

Presented by the Author.

ORR (*Sir* JOHN B.) *and* WELLS (FRANK) 728 : 696/699

Housing and health. (Design for Britain (Second series), 26.)

pam. 8½″. Lond.: Dent. 1944. 6d. R.

Inf. file 728.1 (42) + 711.4 (42)

COMMON WEALTH, *political organisation*

Information bulletin. No. 3, Apl. Housing & planning.

pam. 8¼″. Lond. 1944. 6d. R.

Inf. file 728.1 (42) + 711.4 (42)

WORKERS' EDUCATIONAL ASSOCIATION

W.E.A. Topics for discussion:

No. 7. Houses and towns to live in. [By Jennie Riddell.]

pam. 7¼″. Lond. [1944.] 3d. *Presented.*

728.1 (42) : 940.5344 + 711.4 (42) : 940.5344

MCALLISTER (ELIZABETH G.)

Houses and towns after the war. (Design for Britain (Second series), 30.)

pam. 8½″. Lond.: Dent. 1944. 6d. R.

MANCHESTER *city* Inf. file 728.1 (42.72 M) : 940.5344 (064)

Exhibition of post-war housing. . . . in the gas showrooms town hall extension. By M— [city] Housing Committee . . . with . . . Gas Committee. [By John Hughes.]

folded leaflet, 7¾″. 1944. R.

BLANDFORD (J. B.), *junr.* Inf. file 728.1 (73)

Next steps in our housing program . . . before the National Association of Housing Officials *&c.*

typescript. 10½″. 1944.

Presented by the American Library.

MINISTRY OF WORKS Inf. file 728.1 : 693.061 (42) MoW .064

Emergency factory-made house. Notes on accommodad[t]ion and construction on the amended plan. (Press notice.) (June.)

dupl. typescript & *Repr.*, 2 sheets. 1944.

Press notices not normally catalogued.

Inf. file 728.1 : 693.061 (42) MoW

ASSOCIATION OF BUILDING TECHNICIANS

The Emergency factory-made house. A report *&c.* (Description, criticism, suggestion, *cover sub-title.*) [Based on revised design.]

dupl. typescript. *Repr.* cover. 8″ × 6½″. 1944. R.

COLE (G. D. H.) 728.1 [72.08 : 334.1

Building societies and the housing problems. (Design for Britain (Second series), 28.)

pam. 8½″. Lond.: Dent. 1943. 6d. R.

SIMON (*Lady* SHENA D.) 728.1 [72.08 : 336.211 : 352

Local rates and post-war housing. (Design for Britain (Second series), 33.)

pam. 8½″. Lond.: Dent. 1943. 6d. R.

MINISTRY OF HEALTH Inf. file 728.1 : 728.68 (42)

Housing of agricultural workers. War-time emergency programme. (Circular 2766.)

dupl. typescript. 8¾″ × 7¼″. Lond. 1943. R.

Inf. file 728.1 : 728.68 (42)

Rural housing. (Circular 64/44.)

leaflet. 10″. Lond.: H.M.S.O. 1944. 1d. R.

Inf file 728.1 : 728.68] 711.32

COUNCIL FOR THE PRESERVATION OF RURAL ENGLAND

Housing and the Scott report [M. of Works and Planning: Committee on Land Utilisation in Rural Areas].

pam. 9¾″. Lond. [1942 or -43.] R.

728.67 : 940.5344

NATIONAL VETERINARY MEDICAL ASSOCIATION OF GREAT BRITAIN AND IRELAND

*Memorandum on farm buildings. Prepared . . . and submitted to the Committee . . . [of] Ministry of Agriculture and Fisheries . . . [on] Farm Buildings *&c.* (N.V.M.A. Publications: No. 7.)

pam. 8½″. n.p. 1943 [1944]. 5s. R. & P. (3).

Superseding dupl. typescript & *Repr.*, 1943, in Library.

DETAILS

SCRANTON (R. L.) 729.311.6.032.8

Greek walls. (American School of Classical Studies at Athens.)

10″. xvi + 194 pp. Cambridge, Mass.: Harvard U.P. 1941. (£1.) P.

ALLIED ARTS

7 : 37] 940.5

COLUMBIA *University, New York*: TEACHERS' COLLEGE—FINE ARTS STAFF

Art education today. Art education and the war. Sponsored by members of the Fine Arts staff *&c.* [Arts. by M. S. Fox and others.]

10″. (viii) + 72 pp. New York: the Univ.: Teachers' Coll., Bureau of Pubns. 1943. ($1.25.) R.

CADBURY *Bros. Ltd., publ.* 7.036 (42) : 3

Changing Britain. Illustrating the Industrial Revolution: 1750-19 . .? (Changing Britain *series*, No. 1.)

ob. 6¼″ × 9″. 36 pp. + covers. Bournville: Cadbury: Bickley: Univ. of Lond. Press. 1943. 1s. R.

ROYAL SOCIETY OF BRITISH SCULPTORS 73.025

Pamphlet on the care and cleaning of sculpture.

2nd ed. pam. 7¾″. 1928. *Presented.*

BUILDING

SPECIFICATION, *annual* 69 [72.08 : 608.375

——. 1944. 46th yr. F. R. S. Yorke, editor.

Lond.: Archl. Press. [1944.] 15s. P.

MATERIALS

DAVEY (H. T.) 691.11 : 674

Wood finishing. Staining and polishing, and cellulose wood finishes. *&c.*

8½″. viii + 224 pp. + (3) pls. Lond.: Pitman. 1940. 12s. 6d. P.

TIMBER DEVELOPMENT ASSOCIATION Inf. file 691.11 : 699.81

*The Fireproofing of timber.

pam. 7¼″. Lond. [1944.] R. (2).

CEMENT AND CONCRETE ASSOCIATION 691.32 : 666.97 (083)

Concrete products manufacturers in England, Wales and Scotland. With a note of the products *&c.* (E. 40.)

10″. (i) + 69 pp. incl. inside covers + folding map. Lond. 1943. R.

BRITISH STANDARDS INSTITUTION 69 (083.74)

B s.:

691.322.55

1165. Clinker aggregate for plain concrete.

1944. 2s. R.

691.771 L (085)

HIGH DUTY ALLOYS *Ltd., Slough*: RESEARCH LABORATORIES

Some mechanical and physical properties of Liduminium R.R. 56.

8¾″. vii + 127 pp. Slough. [1943.] R.

CONSTRUCTION

693.1 : 366.1] 091 : 016

KNOOP (DOUGLAS) *and* JONES (G. P.), *editors*

A Handlist of masonic documents. (2nd ed. *of* Handlist of MSS. *in* The Nomenclature of masonic MSS., 1941.)

7½″. viii + 56 pp. Manchester: U.P. 1942. 5s.

Presented by Prof. Knoop.

ARUP (OVE [N.]) 693.5 : 728.1/25

*Memorandum on box frame construction for terrace houses and flats.

dupl. typescript. 13″. pls. 1944.

Presented by the Author (2).

SANITARY SCIENCE AND EQUIPMENT

Inf. file 696/699 : 940.5344
INSTITUTION OF SANITARY ENGINEERS + 628 : 940.5344
Post-war sanitary engineering problems.
pam. 8½″. Lond. 1944.
Presented through the Ministry of Town and Country Planning.

ILLUMINATING ENGINEERING SOCIETY] Inf. file 696.92
Natural lighting. General considerations for those concerned with lighting problems of reconstruction. (Lighting reconstruction pamphlet No. 4.)
pam. 8½″. [Lond. 1944.] R.

(A.R.P., WAR DAMAGE)

Inf. file 699.895 : 72.025.1 (42)] 72.064
NATIONAL BUILDINGS RECORD
N— B— R—. Exhibition of photographs and drawings of English architecture. National Gallery . . . 1944.
pam. 7¼″. [Lond. 1944.] 6d. R.

COLLIER (RONALD) 699.895 : 72.025.1] 333
Valuation for war damage. Reprinted from Butterworth's [*publ.*] Emergency legislation service (annotated).
9½″. vii + 276 pp. Lond. : Butterworth. 1944. 10s. 6d. R.

STAPLES (RONALD), *ed.* 699.895 : 72.025.1] 34
'Taxation' [*jnl.*] Key to war damage. . . . War Damage Act 1943 *&c., cover title.*
8½″. 138 pp. Lond. : Taxation Pubg. Co. [1943.] 6s. R.

TOPOGRAPHY

ECCLESIOLOGICAL SOCIETY 91 (42) : 7114.
Transactions : Vol. i (N.S.)—pt. 3 :
The Continuity of the English town. [Exhibition by S.P.A.B. and other societies.]
8½″. (84) pp. + 27 pls. Lond. : S.P.C.K. 1943. 4s. 6d. R.

GARDINER (C. H.) 91 (42) : 711.437
Your village and mine.
7½″. 198 pp. Lond. : Faber & Faber. 1944. 7s. 6d. R.

TOWN & COUNTRY PLANNING

YOUNG (G. M.), *editor* 711
Country and town. A summary of the Scott and Uthwatt reports. (Penguin special. S 139.)
7¼″. 142 pp. Harmondsworth : Penguin Books. 1943. 9d. R.

ARCHITECTURAL PRESS, *publ.* 711
Planning for reconstruction.
6″. 97 pp. + covers. Cheam. [1944.] 1s. R.

711 (494) (063)
ZÜRICH : EIDGENÖSSISCHE TECHNISCHE HOCHSCHULE
E. T. H.-Tagung für landesplanung. . . . 1942 . . . Vorträge.
11¾″. iv + 151 pp. incl. pl. with mounted figs. Zürich : Leemann. 1943.
Presented by the E.T.H.

TOWN PLANNING AND REPLANNING

LEIPZIGER (HUGO) 711.4 + 711.6 + 711.4 (7/8)
*The Architectonic city in the Americas. *&c.*
12″. 110 pp. incl. 40 pls. (backed). Austin, U.S. : Univ. of Texas Press. [1944.]
Presented by the Author.

711.4—163 (42) (063) + 711 (42) (063)
TOWN AND COUNTRY PLANNING ASSOCIATION
Ways and means of rebuilding, being a report of the London conference . . . 1943. Ed. by Donald Tyerman.
8¾″. 111 pp. Lond. : Faber & Faber. 1944. 8s. 6d. R.

ZONING

SLOUGH ESTATES *Ltd.* 711.554 [940.5 : 940.5344
*Adapting war-time sites to post-war uses. Showing the proposed treatment of sites . . . and a method of survey for the selection of suitable sites. [Maps by Association for Planning and Regional Reconstruction.]
ob. 8¾″ × 10¾″. 31 pp. n.p. priv. prin. [1944.]
Presented by the firm (3).

FAWCETT (C. B.) 711.58
A Residential unit for town and country planning. [The 'vill' as unit.]
7¼″. 72 pp. Bickley : Univ. of Lond. Press. 1944. 3s. P.

OLDER WORKS

Prof. D. Arkin [*H.C.M.*], *of Moscow* (1, to Loan).
Mrs. Dawson, from the library of the late Mr. Matthew Dawson [*F.*] (3, including 1 to Loan).
Mr. Rudolf Fraenkel (1, to Loan).
Mr. B. A. P. W. Lewis [*A.*]
Presented (*anonymously*) (1).
Purchased (2).

Review of Periodicals

1943-44—III (interim list), *concld.*

HISTORY, *contd.*

ARCHITECTURAL REVIEW, *1944 Mar., pp. 58-84 :*
Brazil. Special number with articles by J. de Sousa-Leae, Sacheverell Sitwell, G. E. Kidder-Smith on architecture and arts and topography, illusd. by Kidder-Smith's photographs of old and modern buildings, etc.

COUNTRY LIFE, *1944 Mar. 17, pp. 458-9 :*
England's Old Court-houses, by Arthur Gaunt. Speech house, Forest of Dean ; Lancaster Castle, Long Crendon, Knaresborough, etc. Illusd.

ROYAL ENGINEERS' JOURNAL, *1944 Mar., pp. 1-10 :*
Early (17th and 18th century) fortification engineers in the E. India Co., at Fort William, Calcutta.

WOOD, *1944 Mar., pp. 62-3 :*
Wooden churches in Ruthenia, illusd. and described by H. E. Adler.

ANTIQUARIES' JOURNAL, *1943 July-Oct., pp. 123-47 ; 1944 Jan.-Apl., pp. 16-21 :*
Exeter Cathedral altar screen : a conjectural restoration of the 14th century screen by Percy Morris [*F.*]. Fully illusd.

COUNTRY LIFE, *1944 Mar. 31, pp. 552-5 :*
St. John's Jerusalem, Sutton-at-Hone, Kent, dating from 1199, presented to Natl. Trust by Sir Stephen Tallents. Description by C. Hussey.

BURLINGTON MAGAZINE, *1944 Mar., pp. 83-7 :*
Portuguese tiles in Brazilian architecture, by J. de Sousa-Leão. Illusd.

ARCHITECTURAL VOCATION ; PROFESSIONAL PRACTICE

JNL., RYL. ARCHITECTURAL INST. OF CANADA, *1944 Jan., pp. 13-17 :*
"Brief from A.R.G.O." (Architectural Research Group, Ottawa). Statement of aims of progressive group Canadian architects, with special reference status and working methods of profession, inc. group working.

JNL., AMERICAN INSTITUTE OF ARCHITECTS (Washington), *1944 Jan., pp. 22-6 :*
The place of the architect. Address by C. Taylor to A.I.A., Louisville, 1940.

BUILDER, *1944 Mar. 24, pp. 241-3 :*
Quantity surveyors' post-war problems. Paper by A. Harris, F.S.I., and discussion.

BUILDING (general)

NATIONAL BUILDER, *1944 Mar., pp. 156-7 :*
U.S. building methods : interview with Sir George Burt.

STRUCTURAL MECHANICS

ILLUSD. CARPENTER AND BUILDER, *1944 Mar., pp. 286-8 :*
Sheet zinc roofing, by E. Lucas. No. 33 in Roof coverings series.

ILLUSTD. CARPENTER AND BUILDER, *1944 Mar. 10, pp. 256-7 :*
Lead parapet gutters in Roof coverings series, by E. Lucas.

ARCHITECTS' JOURNAL, *1944 Mar. 16, Information Sheet 933 :*
Suspended ceilings for sound insulation.

PENCIL POINTS (N. York), *1944 Jan., p. 69 :*
Escalator detail by Skidmore, Owings & Merrill.

MATERIALS

ARCHITECTURAL DESIGN AND CONSTRUCTION, *1944 Mar., p. 69 :*
Clipsham stone : characteristics and quarrying.

ARCHITECTURAL DESIGN AND CONSTRUCTION, *1944 Jan., pp. 15-17 ; Mar., p. 69 :*
Plastics : (Jan.) papers by R. J. Schaffer and H. H. Lusty ; (Mar.) chart by T. Warnett Kennedy.

CONSTRUCTION, including PREFABRICATION

ARCHITECTS' JOURNAL, *1944 Mar. 23, pp. 233-4 :*
Prefabricated dwellings—multiple demands of a housing programme—comparison of American costs ; by Sir George Burt, chairman B.R.S. From THE TIMES, Mar. 11.

AMERICAN CITY (N. York), *1943 Dec., p. 64 :*
Factory-built houses : an urban threat. Criticism of prefabrication possibilities by A. C. Schweizer, formerly principal planning technician N.R.P.B.

IRISH BUILDER AND ENGINEER (Dublin), *1944 Mar. 25, pp. 122-6 :*
Gunite and pressure grouting. Paper to N. Ireland Assn. of I.C.E., by C. S. P. Randall.

ARCHITECTS' JOURNAL, *1944 Mar. 9, pp. 196-8 & xxviii ;*
JNL. R.I.B.A., *Mar., pp. 118-126 ;*
WOOD, *Mar., pp. 64-71 :*
Recent experience in the design of timber structures. Paper to A.S.B. by P. O. Reece, A.M.Inst.C.E. ; illusd. diagrams, etc.

SANITARY SCIENCE AND EQUIPMENT, PROOFING

JNL. ROYAL SOCIETY OF ARTS, *1944 Mar. 17, pp. 186-98 :*
London's water supply. Paper by H. Berry, chairman, Metropolitan Water Board.

JOURNAL OF INSTN. HEATING AND VENTILATING ENGINEERS, *1944 Jan.-Feb., pp. 214— :*
Domestic fires for heating and cooking : a "fireside talk," by A. F. Dufton, of B.R.S., on design and comparative performances of various fire types.

PENCIL POINTS (N. York), *1944 Jan., pp. 43-50 :*
Planning against noise : lay-out of structures to minimise sound transmission by D. D. Harrison [*A.*], summarising and supplementing work published by Building Research Stn. Illusd. plans and diagrams.

WAR DAMAGE

ARCHITECTURAL REVIEW, *1944 Mar., pp. xlix-l :*
Sicily : war damage to historical monuments. Note on official War Office report.

ENGINEERING

JNL., INSTN. MUNICIPAL AND COUNTY ENGINEERS, *1944 Mar. 7, pp. 342-51 :*
Thames Barrage scheme, 1936. Described by P. Smart, Boro. Engineer, Southwark.

TOWN AND COUNTRY PLANNING

WERK (Zürich), *1944 Jan., pp. 1-9 :*
Planning and building after the war : Articles "The hundred years' war," by Le Corbusier—the 100 years since the invention of the locomotive. "Planning and building after the war from the Swiss viewpoint," by A. Roth, with outline of publication "Civitas" on problems of "the human city." "Rebuilding in Britain," by H. Bernouilli.

JNL., ROYAL ARCHITECTURAL INST. OF CANADA, *1944 Jan., pp. 10-14 :*
Planning. What it is and the Canadian opportunity. A statement by the Architectural Research Group, Ottawa. Illusd. plans, diagrams.

REGIONAL PLANNING

JNL. OF THE CHARTERED SURVEYORS' INSTN., *1944 Mar., pp. 400-7 :*
County of London plan : Memorandum of observations by the C.S.I. Council.

TOWN PLANNING AND RE-PLANNING

BUILDER, *1944 Mar. 31, p. 256 :*
City of London : suggested plan by H. Baily [*F.*].

ARCHITECT AND BG. NEWS, *1944, Mar. 17, pp. 190-1 ;*
ARCHITECTS' JOURNAL, *Mar. 23, pp. 227-9 :*
City of London replanning : a scheme by Kenneth J. Lindy and B. A. P. W. Lewis [*A.*].

BUILDER, *1944 Mar. 17, p. 218 :*
Leicester. Interim planning scheme, briefly described and illusd.

AMERICAN CITY (N. York), *1943 Dec., pp. 47-8 :*
Plan for obsolete sq. mile of St. Louis. Neighbourhood development on garden suburb lines.

ZONING

SCOPE, *1944 Mar., pp. 32-4, 36 :*
Zoning : short article on zoning for distribution of products to save transport, with 5 specimen maps of England. From MODERN TRANSPORT.

TRANSPORT PLANNING

ARCHITECTS' JOURNAL, *1944 Mar. 16, pp. 205-8 ; Mar. 23, pp. 223-6 :*
Transport : We must plan transport as a combined operation : in Physical planning series. Pt. 1, by F. M. Wilson ; 2, by L. F. Richards.

GARDENS

AMERICAN CITY (N. York), *1943 Dec., pp. 53— :*
Parks, parkways, express arteries and related plans for N. York City after the war ; detailed survey of projects by Robert Moses. Illusd. plans, views, etc.

Correspondence

POST-WAR HEADACHES FOR THE PRACTISING ARCHITECT

12, Bloomsbury Square, London, W.C.1
Holborn 6177

The Editor,
THE JOURNAL R.I.B.A.

31 July 1944

DEAR MR. EDITOR,—For the past two years I have been endeavouring to keep my architectural knowledge up-to-date, and I have read every Act, White Paper, Report, Code, B.S.S., and report of important speech that I have been able to get hold of. This has given me a great deal of technical knowledge as well as a few headaches, and I have spent part of this year's summer rest (in lieu of holiday) trying to summarise the present position of a practising architect, the advice he will be able to give to his clients, and the procedure that he will have to adopt, after the war.

My conclusions are not very encouraging, as there seem to be so many doubts, restrictions, regulations, confusions and contradictions that it may not be possible to practise at all, and therefore I am writing to point out the position that we have drifted into, and to suggest that the R.I.B.A. should review the position of a large section of our members with a view to giving them some guidance for the future.

Of the many difficulties that we will have to face, the following are a representative sample, but by no means a full list :—

Civil Building Licensing.

We have been told that licensing will continue for some years after the war, but no list of priorities has been published, so that an architect cannot advise his clients what classes of buildings will be allowed to proceed or when. We know, of course, that housing must come first, and that schools will be high on the list, but the public must also have buildings to work in, to obtain supplies from, and for many health, recreational and communal purposes ; which of these are to be permitted, and in what order of priority ?

In my experience it takes anything up to ten months to obtain a building licence now, and when obtained the licence can be revoked at any time. How long will it take to obtain a licence after the war, and will it still be subject to revocation ? If revoked, who will compensate the client for any loss ? At present licence applications are comparatively few in number and are small in value ; after the war there will be huge numbers of applications, and the average value will be much greater ; what machinery, if any, is being prepared to deal with all this ?

Town Planning.

All architects wish to see our towns and countryside developed to the best advantage in the public interest, but what is to happen during the long interim period whilst the plans are being prepared, approved and published ? Some local authorities will not consider an application unless an undertaking can be given that the building can commence within six months ; others will not consider applications at all. Apparently no reasons need be given, and there is no right of appeal. How can any building commence within a definite period when there is no limit to the time that the Ministry of Works will take to grant a building licence ?

Bye-Laws and Building Acts.

Our Model Bye-laws and Building Acts are the same now as they were before the war. Led by the Government, many architects, industrial concerns and private individuals have been experimenting with alternative materials and forms of construction which do not comply with the present regulations. Are these alternatives to be permitted ? Local authorities can and do ignore their own bye-laws, but what is the position of the private owner ?

Post-War Building Reports, and Codes of Practice.

These are now appearing in large numbers, backed up with a steady flow of British Standard Specifications. How are they to be used ? Will building licences be conditional upon the relevant codes being used ? Or the latest B.S.S. ? Or will they be incorporated into the Model Bye-laws ? And what happens when a Code does not comply with the Bye-laws ?

War Damage.

The latest publication of the Commission, R.O.D.1, requires (or "advises") previous consultation in cases which will cost over £250, and in all cases in which there is some doubt as to the extent of the work. Also, the Commission wishes to approve working drawings, specifications, bills of quantities, forms of contract and tenders, before the work is commenced. The present machinery creaks badly when dealing with the comparatively small number of claims being made now, although most of the present claims are small, and long delays are the rule rather than the exception. What machinery, if any, has been prepared to deal with the much larger number of claims that will be made after the war, and of very much higher value than are now being made?

Housing by Private Enterprise.

We have been told that a large contribution is expected towards the housing shortage from private enterprise, and it has been stated that the subsidy will not be confined to houses built by local authorities. This would appear to be the legitimate field for the practising architect, but a brief examination shows that the position is almost hopeless. Local authorities can obtain land at 1939 prices, whilst private enterprise must pay current market prices; local authorities can plan now, whilst private enterprise must apply for town-planning consent and very likely not get it; local authorities will be able to commence work whenever they are ready, but private enterprise will have to apply for a building licence and wait indefinitely for it; local authorities can ignore their own bye-laws, but private enterprise must comply. Obviously private enterprise will hardly be able to operate at all under these circumstances.

Cost

What will a building cost even when it can be built? The Government say that the cost of building must come down, but are strangely reticent about how. Are rates of wages to be lowered, or holidays-with-pay cut out, or the guaranteed week dropped? Is "organisation and management" to be the panacea for all ills, as if it had not been thought of before.

And what will be the cost of land, when there may be an 80 per cent. betterment tax on it? And who will own it anyhow? The White Paper on the Use of Land leaves some horrid doubts.

I do not want to make this list any longer, because it is depressing enough as it is. It would be easy to raise other points on the Full Employment White Paper, the relation between the Restriction of Ribbon Development Act and recent Town-Planning proposals, the treatment of chartered architects by the War Damage Commission, etc., but probably I have mentioned enough to illustrate the position that we have been drifting into.

The sort of questions that a practising architect will have to find answers for are:—If a client wishes to erect a commercial building on a bombed site, which authority is to be dealt with first, and how? Is the order of procedure Town-Planning, Bye-laws, War Damage Commission and Ministry of Works? If Town-Planning and Building Act consents are obtained, R.O.D.1 successfully navigated, and the licence refused, what fee can be asked for the enormous amount of preliminary work, and will the client pay it? If under Town-Planning a building must be started within six months, and the other authorities take longer, what is the position? At what stage in the proceedings should the bills of quantities be prepared, bearing in mind that the whole job may fall through at any time because of one or other of the authorities? At what stage should party walls and easements be dealt with under these conditions? How long can a Contractor be expected to keep a tender open when costs may be fluctuating violently and the War Damage Commission and the Ministry of Works both want to see the tender and will probably take months to deal with it?

A whole series of similar questions could be asked on the technical side, where it seems quite impossible to reconcile various reports and codes with bye-laws, such as the effect of discontinuous structure for sound insulation upon the London Building Act. The tendency of all this is to make private practice almost impossible, for we should have to spend the best part of our lives trying to find a way through, or round, vast entanglements of red tape.

Therefore I would suggest that the R.I.B.A. should review the position of the profession, and see what can be done to get architectural work going again within a reasonable time after the war, on a basis that it is possible to operate.

Yours truly,

PERCY V. BURNETT. [*F.*]

THEORY AND PRACTICE IN FENESTRATION

113 Whitchurch Gardens,
Edgware, Middlesex.

The Editor, THE JOURNAL R.I.B.A.

SIR,—Some two years ago architects were promised, on behalf of a D.S.I.R. committee on the Lighting of Buildings, official tables from which window dimensions could be selected to light post-war buildings efficiently with the same ease that scantlings of floor joists are customarily selected from text-book tables.

It may be open to question whether such surrender to the modern craze for labour saving, which has already gone far to injure good architecture by the atrophy of structural skill, would make for good fenestration. Fortunately, however, the official tables, recently published by the N.P.L. in advance of the report of the Committee, in a pamphlet entitled "The Natural Lighting of Houses and Flats, with Graded Daylight Factor Tables," are unlikely to do much harm, as they are based upon an old fallacy, well known in "ancient light" disputes, to which the technical press has promptly drawn attention. This is fortunate because the pamphlet also embodies a more insidious oversight, which could easily fructify into bad design.

The authors have apparently assumed that good fenestration can be based upon tabulated data of the lighting capacities of single windows only, regardless of the effect of multiple windows. They have therefore been led to recommend, in their examples of the practical application of the tables, the gaining of necessary width by increasing the obesity of single windows, rather than by increasing the number of openings of good proportions.

Our architectural forefathers in the 17th and 18th centuries may not have been scientific, but their architectural skill left us a legacy of good fenestration which is to-day both a delight and an inspiration, and can be studied with advantage.

With urban aspects protected by the virtual town planning of the large urban landowners of that period, as we hope that post-war town planning will protect post-war town aspects, they were content merely to keep their window heads as near as practicable to the ceilings and to gain the width necessary for light or for view by increasing the number rather than the width of openings. The results were eminently successful.

As one who has for some 40 years past been trying to infuse a little accuracy into the subject of natural lighting, may I suggest that in the present state of our knowledge (and I have been supplied with a typescript of the full report of the Committee) it may not be possible to do much more than follow the excellent examples of fenestration to be found in innumerable Georgian and Regency small town houses.

Window efficiency is necessarily so severely and inexorably rationed by town planning restrictions on overbuilding that the post-war designer can only take whatever the town planner gives him in any situation and make the best of it. Science may help; but there is much to be done before natural lighting can be treated as an exact science.

Yours faithfully,

PERCY J. WALDRAM [*L.*].

"SOCIAL SURVEY TECHNIQUE"

To the Editor of THE JOURNAL R.I.B.A.

DEAR SIR,—May I, as a non-technical member of the audience who heard Mr. Dennis Chapman's lecture at the R.I.B.A. on June 6, humbly express the view that it is possible to place too much importance on collective mass opinion in relation to housing problems.

Whilst the compilation of statistics from vast quantities of intimate detail on the habits and preferences of the housewife may have some value as a record of how a small section of the population are living to-day, does such data really make any constructive contribution to the problem of planning well-planned houses at an economical cost?

For instance, when Mr. Chapman told his audience that it was customary in many households for the menfolk to dress and undress in the bathroom, and therefore the size of bathroom allowed for in the Portal house would need to be much bigger, and that although large windows might be provided in a modern house, they were frequently covered up by thick curtains, or had rows of flower-pots placed in front of them—I could not help thinking that the lecturer was "barking up the wrong tree." Is it not the community who need instruction on the proper uses of a bathroom and the proper functions of a window, rather than the man who designs the house? Again, we were told that a room designed to take modern furniture was not necessarily large enough to accommodate the old-fashioned, bulky type of furniture which many households had—to which it seems reasonable to reply that we are building for the future rather than the past, and, in

any case, no one but a magician could cater for every individual requirement in a house which has to conform to a certain standard pattern.

Apart from the obvious ignorance of the public on the technical aspect of architecture and housing, it should be borne in mind that most people have only a very hazy idea of what they want, when it comes to choosing between certain alternatives, or indeed of what they really like, and this solemn attempt to collect and weigh up every conceivable idiosyncracy of the housewife and the man-in-the-street seems more likely to cause confusion than enlightenment.

We have all bemoaned the poor job of our housing during the years between the two wars, owing, we say, to so much of it having been left to the sweet will of the building speculator, but it seems we are now in danger of making the somewhat worse blunder of handing the problem over to the community at large to solve.

In short, I could not help asking myself, is this house-to-house journey really necessary?

If we must have polls of opinion and information on this question of housing, would they not be better carried out by architects who, are, after all, the specialists on the subject. They might, also, whilst they are about it, reverse the usual procedure, and instead of eliciting information from the housewife, seek to impart some guidance on what is and what is not desirable or possible to embody in a standardised house that has to be kept within a certain cost.

When all is said and done, can it be denied that the best and most genuinely-admired houses of this or any other period are those in which the architect has been allowed to follow his own inspiration rather than that of the mass average mind of the public.

Personally, I would like to see our architects shut their ears firmly to the voice of the multitude, and quietly get on with the job which is their special province—that of planning what they conceive to be the best possible houses that can be built within the limits of cost laid down.

Yours truly,

ELIZABETH D. AVRIL.

Notes

OFFER OF PRIZE FOR RESEARCH INTO "REASONABLE DENSITY"

THE CHADWICK TRUST.—BOSSOM BENEFACTION

In connection with housing and rehousing schemes, the Chadwick Trustees, desirous of facilitating investigation of the question of the reasonable maximum "density" range (per acre) for small houses with gardens, suitable especially for the intermediate and outer zones of large towns—with due regard to the amenities essential to a comprehensive town planning arrangement—are prepared to offer an award of £250, to a man or woman qualified to undertake such investigation.

The outline scheme for such research and the choice of a candidate for the award, to be approved by the Trustees.

Those desiring to be considered for the award should make an application in writing, to the Clerk to the Chadwick Trustees, 204, Abbey House, Westminster, S.W.1, accompanied by evidence of qualification and experience and a brief recital of the general plan of research proposed to be adopted. Applications to be received before the end of September.

WORK FOR LOCAL AUTHORITIES AND APPOINTMENTS UNDER SEAL

A note of the case of *Baldwin and Another* v. *The Mayor, Aldermen and Burgesses of the Borough of Finsbury* was published in the April number of the JOURNAL. This case concerned an action in which the plaintiffs lost their claim for fees as they had no formal appointment under seal.

The Council and Practice Committee have drawn attention to this matter on several occasions, but they feel that yet another reminder will not be wasted in case members have not read the previous notices.

It is essential for architects, when working for local authorities and other corporate bodies to secure formal appointments under seal.

OUTLINE OF STUDIES IN TOWN PLANNING

At the request of the R.I.B.A. Committee on the Training of Architects in Town Planning, Dr. H. V. Lanchester, F.R.I.B.A. has prepared an Outline of Studies in Town Planning. Owing to war conditions many of the well-known textbooks on town planning are unobtainable, and this Outline will be especially valuable to those who cannot take a course at a school and must rely on private study.

The Outline has been produced in pamphlet form, and copies can be obtained on application to the R.I.B.A., price 1s. 3d. each, including postage.

MARS GROUP DISCUSSION AT THE R.I.B.A.

The meeting of the Mars Group which was to have been held at the R.I.B.A. on 21 August, for an open discussion on "What is Modern Architecture," has been postponed until the autumn.

GENERAL SCHEME FOR REPAIR OF HOUSES, ETC.

The following circular has been issued by the Ministry of Health:

1. I am directed by the Minister of Health to refer to Circular 2871 of 11 August, 1943, and to state that he has been in consultation with the Minister of Labour and National Service, the Minister of Works, the chairman of the War Damage Commission, and representatives of Local Authorities' Associations with regard to the operation of the general scheme for the repair, conversion and completion of houses, and that it has been decided to raise the limits of permitted expenditure to £500 per house or £400 per flat of similar tenement.

2. The Minister is anxious that as much work as possible of repair, conversion and completion should be carried out now so that when the time comes there can be the maximum concentration on the provision of new houses. He is advised that the increased limits of expenditure should enable local authorities to bring additional housing accommodation into use without detriment to the execution of essential repair to houses which are at present occupied.

3. The Minister is also prepared to consider proposals for higher expenditure in special cases, and in areas where there is a sufficiency of immobile labour for the purpose he would not rule out proposals for rebuilding seriously-damaged or destroyed houses which have been classified by the War Damage Commission as subject to "cost of works" payments.

4. The raising of these limits will apply not only to work to be carried out by the local authorities but also to work to be carried out by private owners under certificates of essentiality. Local authorities are therefore authorised hereby to issue certificates of essentiality to private owners on application, for work up to £500 per house or £400 per flat or similar tenement.

5. I am to emphasise that the raising of the limits makes it more important than ever that before deciding to incur or certify expenditure on a house, the local authority should be satisfied that the condition of the house is such as to justify the expenditure.

6. The Minister trusts that, with the experience the local authorities have now gained of working the scheme during the last few months, the wider latitude now given them will ensure that work under the scheme will show a substantial and steady increase.

7. I am to add that the Minister hopes shortly to send a further circular to local authorities dealing with the various points which have arisen in different areas in the operation of the scheme.

(Signed) S. F. S. HEARDER,
Assistant Secretary

THE R.I.B.A. INTERMEDIATE EXAMINATION, MAY 1944

The R.I.B.A. Intermediate Examination was held in London, Manchester, Leeds, Edinburgh, and Belfast, from 19 to 25 May, 1944.

Of the 110 candidates examined, 37 passed and 73 were relegated. The successful candidates are as follows:

Adams, Ernest G. Y.
Avann, Ivo
Bailey (Miss) Barbara M.
Beech, Geoffrey C.
Bell, Donald W.
Brown, Kenneth R.
Campbell, H. V. Noel
Chatton, Edwin G.
Clark, Eric
Cooper, Kenneth
Corker, Eric J.
Cowan, Donald

Cox, Sidney W.
Henderson, Anthony G.
Heywood (Miss) Christine M.
McCready, Sydney V. W.
Melich, Henry
Milton, Ronald
Moorcroft, Roy L.
Moxham, Brian J.
Needes, Percival J.
Pache, Maurice E.
Raven, Kenneth S.
Reader (Miss) Mary K. W.
Ross, Campbell L. M.
Sterland, William D.
Stokes, Arthur T. J.
Stutchbury, Howard E.
Swann (Miss) R. A.
Tallet (Miss) Margaret P.
Walker, Bernard G.
Watson, Alexander
Weaver, Edward H.
Whittaker, John H.
Whittaker, Telford J.
Wilson, Ronald C.
Wood, H. Sinclair

DATES OF THE FORTHCOMING R.I.B.A. EXAMINATIONS

INTERMEDIATE EXAMINATION.

November 10, 11, 13, 14 and 16, 1944.
(Last day for receiving applications: September 30, 1944.)
May 25, 26, 28, 29 and 31, 1945.
(Last day for receiving applications: March 28, 1945.)
November 9, 10, 12, 13 and 15, 1945.
(Last day for receiving applications: September 29, 1945.)

FINAL EXAMINATION.

December 6, 7, 8, 9, 11, 12 and 14, 1944.
(Last day for receiving applications: October 30, 1944.)
July 4, 5, 6, 7, 9, 10 and 12, 1945.
(Last day for receiving applications: May 28, 1945.)
December 5, 6, 7, 8, 10, 11 and 13, 1945.
(Last day for receiving applications: October 17, 1945.)

SPECIAL FINAL EXAMINATION.

December 6, 7, 8, 9, 11, 12 and 13, 1944.
(Last day for receiving applications: October 30, 1944.)
July 4, 5, 6, 7, 9, 10 and 11, 1945.
(Last day for receiving applications: May 28, 1945.)
December 5, 6, 7, 8, 10, 11 and 12, 1945.
(Last day for receiving applications: October 27, 1945.)

EXAMINATION FOR BUILDING SURVEYORS.

May 2, 3 and 4, 1945.
(Last day for receiving applications: March 20, 1945.)

CORRECTION

We regret that Mr. Howard L. Kelly was incorrectly recorded as Henry L. Kelly in the list of Scrutineers, Annual Election Results, given on page 218 of the July JOURNAL.

NOTES FROM THE MINUTES OF THE COUNCIL

27 JUNE 1944

Birthday Honours List

The congratulations of the Council have been conveyed to the members who were included in the Birthday Honours list.

Ministry of Works Directorate of Post-War Building Study Committee

Committee

The final Report of the Committee on the "Architectural Use of Building Materials," convened by the R.I.B.A., has been submitted to the Ministry of Works.

APPOINTMENTS

British Standards Institution: Committee on Standardisation of Builders' Ironmongery.
Mr. G. M. Adie [*F.*] in place of Mr. Thos. E. Scott [*F.*], who has resigned owing to inability to attend.

British Standards Institution: Sub-Committee on Bath Panels.
Mr. Arnold F. Hooper [*F.*].

R.I.B.A. Representatives on War Memorials Advisory Council (convened by the Royal Society of Arts).
Mr. Edward Maufe [*F.*].
Mr. O. P. Milne [*F.*].

Central Planning Advisory Committee.
Mr. C. Lovett Gill [*F.*] and Mr. Julian Leathart [*F.*] in place of Mr. W. Curtis Green [*F.*] and Mr. F. R. Hiorns [*F.*], who have resigned.

Board of Architectural Education Schools Committee: R.I.B.A. Member.
Mr. T. Bilbow [*F.*].

County Borough of Ipswich: Joint Apprenticeship Committee.
Mr. Martin J. Slater [*A.*].

Simplification of Procedure for Approval of Plans

A communication has been addressed to the Ministry of Works emphasising that the question of simplification of procedure for the approval of plans is regarded by the Institute as one of vital concern in the re-organisation of the building industry, and expressing the hope that careful consideration will be given to the subject by the Ministry.

Women Full-Time Students of Architecture

The Acting Secretary reported the receipt of a letter from the Ministry of Labour and National Service stating that, in order to permit the completion of academic work required for the Final Examination of the R.I.B.A., or an examination which is recognised for exemption from the R.I.B.A. Final, recommendations for reservation will now be considered from Universities and the Heads of Non-University Institutions where there is a School of Architecture in the case of

(*a*) Women full-time Students in the fourth year of their course, who reached the age of 20 during the Session 1943-44, and who will complete their finals in the Summer of 1945; and
(*b*) Women full-time Students in the third year of their course who reached the age of 20 during the Session 1943-44 and are studying at Schools where arrangements have been made to modify the course to enable them to complete their Finals by the end of 1945.

The Acting Secretary reported that the Heads of the Recognised Schools had been advised of this concession.

Obituary

The Acting Secretary reported with regret the death of the following members and Students:

Charles Henry Biddulph-Pinchard [*F.*].
Louis Blanc [*F.*].
Mr. Blanc was formerly Hon. Secretary of the London Building Act Committee.
Ernest Frank Stuart Biram [*Retd. F.*].
Alfred Bowman Yeates, F.S.A. [*Retd. F.*].
Antony Doughty Browne [*A.*]. Killed on active service.
Kenneth Burton [*A.*] Killed on active service.
Alexander Wood Graham-Brown [*A.*].
Mrs. Creina Marian Hutcheson [*A.*].
Lawrence William Ingham [*A.*].
Mr. Ingham was Ashpitel Prizeman, 1921.
Owen John Currie Mason [*A.*]. Killed on active service.
Gordon Stuart Reid [*A.*].
Alexander Forrest [*L.*].
William Griffiths [*L.*] (Birkenhead).
James Alexander Macdonald [*L.*].
William Unsworth [*Retd. L.*].
John Cyril Buckley [*Student*]. Killed on active service.
George Noel Hammond [*Student*]. Killed on active service.
George Witham Lawson [*Student*]. Killed on active service.

Messages of sympathy have been conveyed to their relatives.

Common Preliminary Examination of the Engineering Joint Examination Board and the Probationership R.I.B.A.

On the recommendation of the Board of Architectural Education the Common Preliminary Examination of the Engineering Joint Examination Board is to be substituted for the Preliminary Examination of the Institution of Civil Engineers in the list of examinations recognised for the Probationership of the R.I.B.A.

Report of the Board of Moderators

The Board of Moderators reported the relegation of one candidate for the Special Final Examination held in Southern Rhodesia in January, 1944.

The Board of Moderators also reported the following results of examinations for Prisoners of War in 1943:

Intermediate Examination, Spring, 1943, Stalag Luft 6.

F/Sgt. Douglas Pearcy:

Passed:	A. (History of Architecture).
Relegated:	B. (Calculations of Simple Structural Members).
Papers not received	C. (Design) and D. (Architectural Construction).
Deferred:	Testimonies of Study.

Final Examination, Autumn, 1943, Oflag IX A/H.
Captain R. G. Bateson :

Passed :	B.1. (General Construction).
	C. (Hygiene).
	D. (Specifications).
	F. (Thesis).
Exempted :	B.2 (Theory of Structures).
Deferred :	A. (Design).
	E. (Professional Practice).
	Testimonies of Study.

MEMBERSHIP

Fellowship.
The Council by a unanimous vote elected the following architect to the Fellowship under the powers defined in the Supplemental Charter of 1925 :
Mr. John Francis Deighton Scarborough, President of the Royal Australian Institute of Architects.

Membership.
The following members were elected :
As Fellows (3), as Associates (4), as Licentiates (17).

Election, October, 1944.
Applications for election were approved as follows :
As Hon. Fellow (1), as Fellows (2), as Associates (4), as Licentiates (18).

Reinstatements.
The following ex-members were reinstated :
As Fellow : Percival May Davson.
As Associate : Edward Dominic O'Connor.

Resignations.
The following resignations were accepted with regret :
Frederick George Cundall [*F.*].
Walter Barlow [*L.*].
Arthur Ernest King [*L.*].
Frederick Arthur Tanner [*L.*].

NOTES FROM THE MINUTES OF THE COUNCIL, 4 JULY 1944.

APPOINTMENT OF HON. OFFICERS AND COMMITTEES FOR THE SESSION, 1944-1945

The following Hon. Officers were appointed :

Vice-Presidents : Mr. T. Cecil Howitt, D.S.O. (Nottingham), Mr. Stanley C. Ramsey, Mr. A. Leonard Roberts (Winchester) (Chairman of the R.I.B.A. Allied Societies' Conference), Mr. J. Hubert Worthington, O.B.E., M.A.(Arch.) (Manchester).
Hon. Secretary : M. Michael Waterhouse, M.C., B.A. Oxon.
Hon. Treasurer : Mr. L. Sylvester Sullivan.

The Council also appointed Committees for the Session 1944-45.

APPOINTMENTS

British Standards Institution : Committee on Concrete Floor Tiles :
Mr. Harold E. Moss [*F.*].
R.I.B.A. Representative on Ministry of Works Committee on Standardisation of Materials for School Buildings :
Mr. P. W. Hubbard [*F.*].
R.I.B.A. Representative on Executive Committee of National Baby Welfare Council :
Mrs. K. W. Farms ([*A.*].
R.I.B.A. Representative on National Council of Women of Great Britain (Housing Sectional Committee) :
Miss G. W. M. Leverkus [*F.*].

INCOME TAX SUBSCRIPTIONS AND RETENTION FEES.

On the recommendation of the Salaried Members' Committee, the Chartered Surveyors' Institution are to be invited to join the R.I.B.A. in submitting a considered case to the Board of Inland Revenue with the object of securing a rebate on the payment of all salaried members' subscription and registration retention fees, a concession which has hitherto been granted only to private practitioners.

RELATIONSHIP BETWEEN MEN'S AND WOMEN'S SALARIES.

The Council approved a recommendation from the Salaried Members' Committee that representations should be made against the present practice of subjecting the salaries of women architects in Government service to a 20 per cent. cut grade for grade. The attention of the Treasury is accordingly to be directed to the fact that Clause 7 of the Notes appended to the Institute's Scale of Annual Salaries for Architects stipulates that the Scale should apply irrespective of sex provided that the duties, responsibilities and services rendered are identical, and that the Institute strongly support the principle of equal pay for equal work.

OBITUARY.

The Acting Secretary reported with regret the death of the following Members and Students :

Charles Saunders [*Retd.F.*]
Cecil Alexander Sharp [*Retd. F.*]
Herbert Lionel Thornely [*Retd. F.*]
John Edwin Yerbury [*Retd. F.*]
Mr. Yerbury was a past member of the Council.
John Nigel Grey Bruce [*A.*]. Killed on active service.
Willie Wrigley [*A.*]
Ernest Alfred Dakin [*L.*]
Paul Marcel Dorkins [*Student*]
Eric Williamson [*Student*]. Killed on active service.

Messages of sympathy have been conveyed to their relatives.

MEMBERSHIP

One overseas candidate was elected to the Associateship.
Election October 1944 :
Applications for election were approved as follows :
As Fellows (2), as Associates (2), as Licentiates (1).
Election November 1944 :
One application from an overseas candidate for election as an Associate was also approved.
Reinstatement :
The following ex-member was reinstated :
As Fellow : Delamark Frank Ingleton.

Competitions

TERRACE HOUSING COMPETITION

NATIONAL HOUSING AND TOWN PLANNING COUNCIL

The National Housing and Town Planning Council invite architects and students of architecture to submit in competition designs for houses suitable for State-aided housing schemes in urban areas to be erected in terraces.

Assessor : Mr. Louis de Soissons, O.B.E., A.R.A. [*F.*].
Premiums : £125, £75, and a further £75 to be awarded at the discretion of the Assessor.
Last day for submitting designs : 12 October 1944.
No questions will be answered.
Conditions may be obtained on application to the Secretary, National Housing and Town Planning Council, 41, Russell Square, London, W.C.1.

COMPETITION RESULT

"TARRAN" SYSTEM : HOUSE DESIGNS

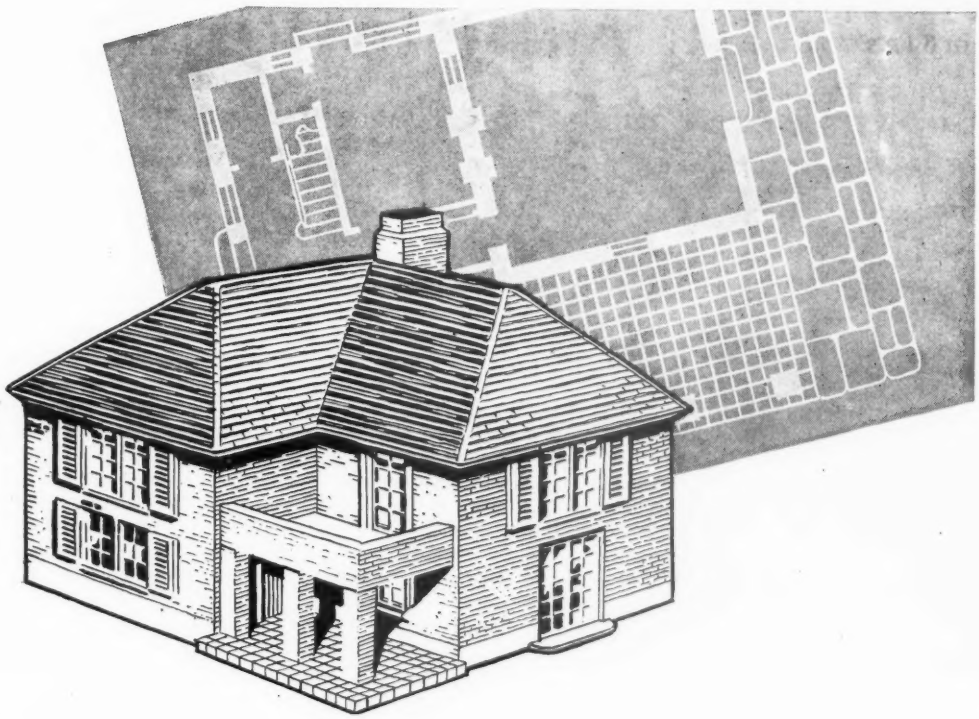
Bungalow with Two Bedrooms :
1, Frederick Hill [*A.*], ; 2, A. M. Foyle [*A.*] and Glyn Roberts [*A.*]; 3, A. Pickles. Commended : J. H. McMorland.
Bungalow with Three Bedrooms :
1, A. M. Foyle [*A.*] and Glyn Roberts [*A.*] ; 2, A. I. Richards; 3, E. S. W. Atherton [*A.*] and B. E. Brenchley [*A.*].
House with Two Bedrooms :
1, G. E. Salt [*L.*] ; 2, R. S. Shapley [*A.*] and H. S. Davison [*A.*]; 3, J. P. Tingay [*A.*].
House with Three Bedrooms :
1, G. E. Salt [*L.*] ; 2, E. H. Lockton [*A.*] ; 3, R. S. Shapley [*A.*] and H. S. Davison [*A.*]. Commended : E. S. W. Atherton [*A.*] and B. E. Brenchley [*A.*].

MEMBERS' COLUMN

Member wishes to sell the first two parts, Vol. I of R.I.B.A. Transactions, dated 1836 and 1842. Both in very fair condition. Latter contains Prof. Willis's paper on "Vaults of the Middle Ages."—Reply Box No. 1574, c/o ACTING SECRETARY, R.I.B.A.

Member urgently requires flatlet or convenient bed-sitting-room with cooking facilities, in London area, W.C. or S.W. preferred. Can provide own bed linen, etc.—Miss J. E. Townsend, at 142 Crofton Road, Orpington, Kent.

Member, ex R.E. Officer, age 41, with wide and varied experience, seeks Partnership or position as Chief Assistant, where good prospects for post-war work exist; this country or abroad.—Full particulars to Box 9844, ACTING SECRETARY, R.I.B.A.



KEEPING FAITH WITH THE FUTURE

In the homes of the future, *good* lighting will be demanded as one of the indispensable amenities. Good lighting implies not only improved standards of general illumination, but also a wider flexibility in the application of lighting, both decorative and localised, to the needs of the home.

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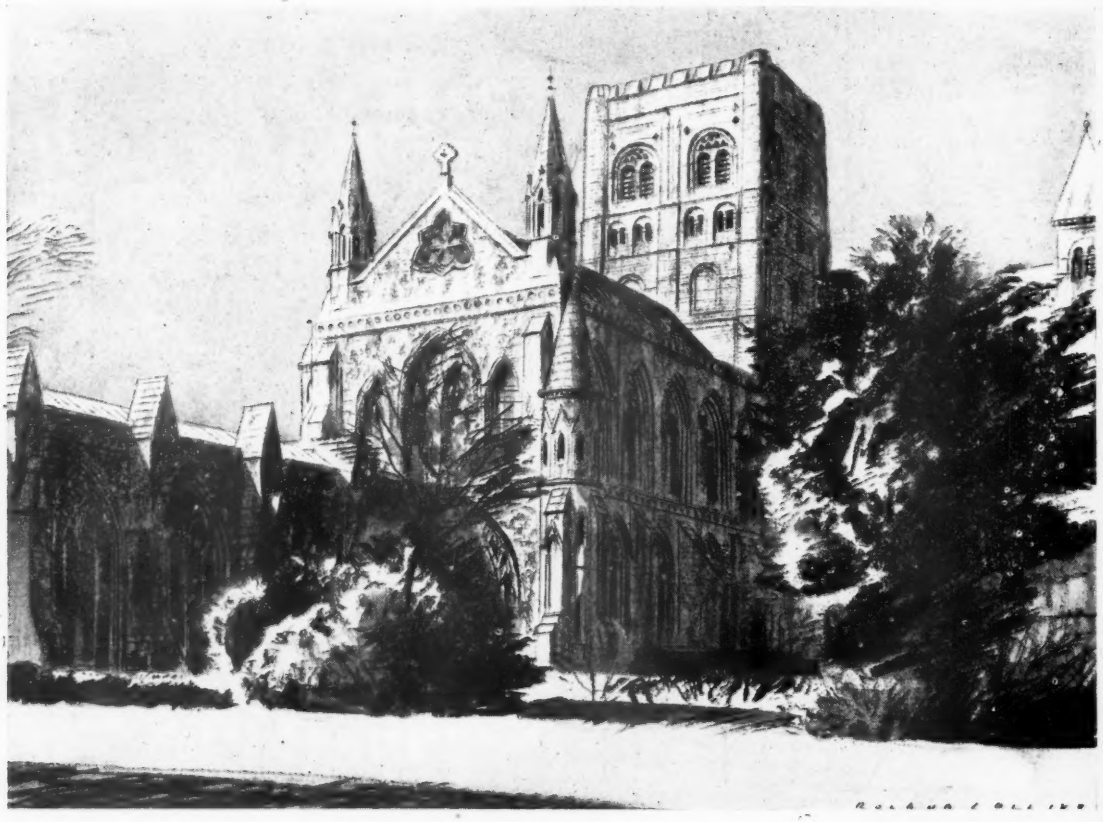

★ The massive Norman tower of St. Alban's Abbey, Hertfordshire, one of the greatest in the country, was built between 1010 and 1093 by Abbot Paul de Caen. It is composed of bricks pillaged from the Roman city of Verulamium, on a hill across the little river Ver, and is remarkable for its lovely colour in the sunlight of an autumn evening.

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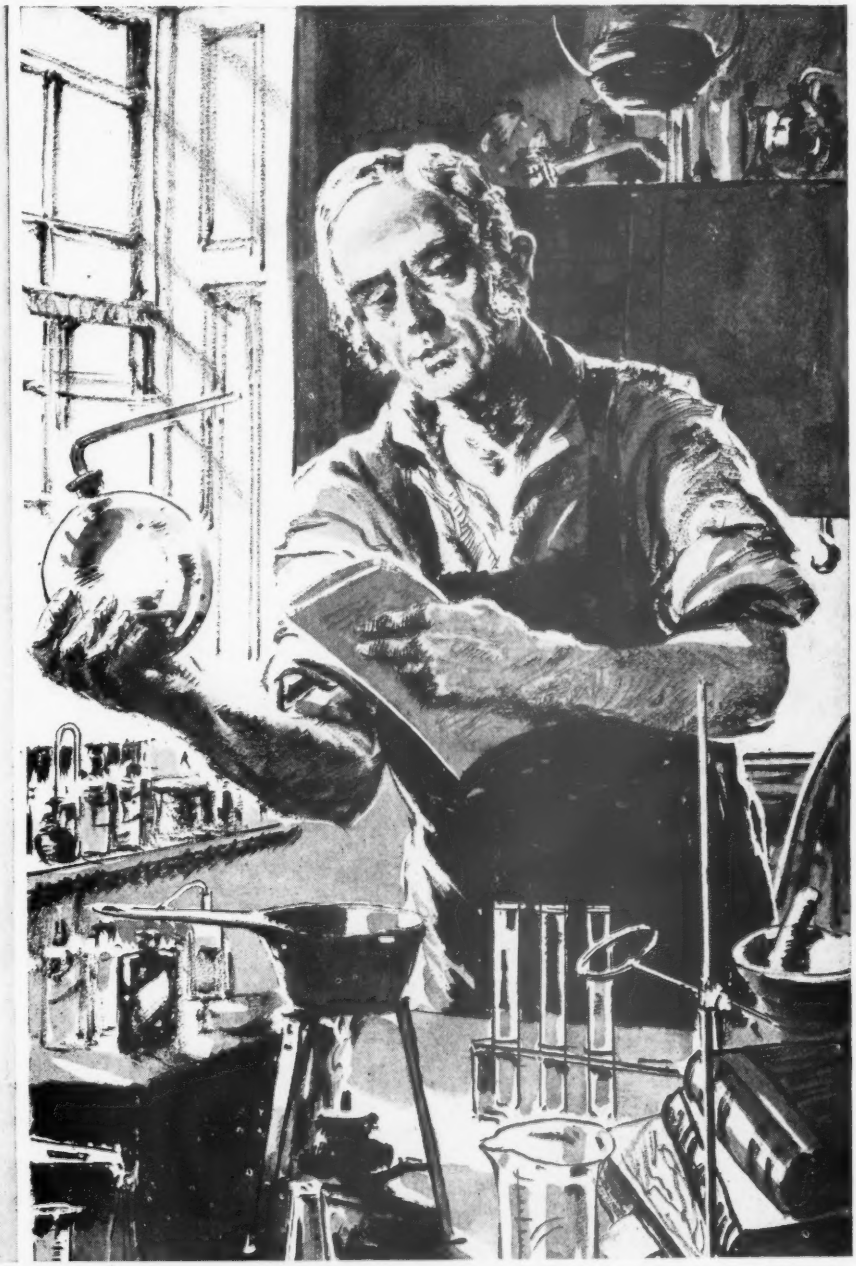

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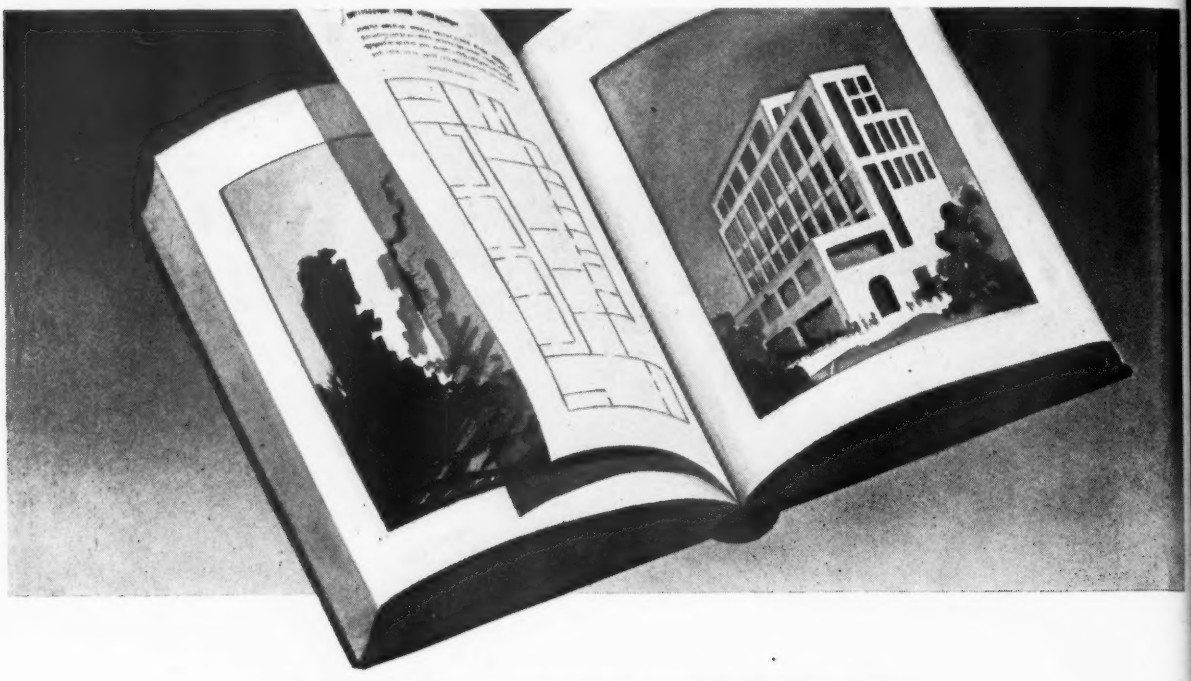

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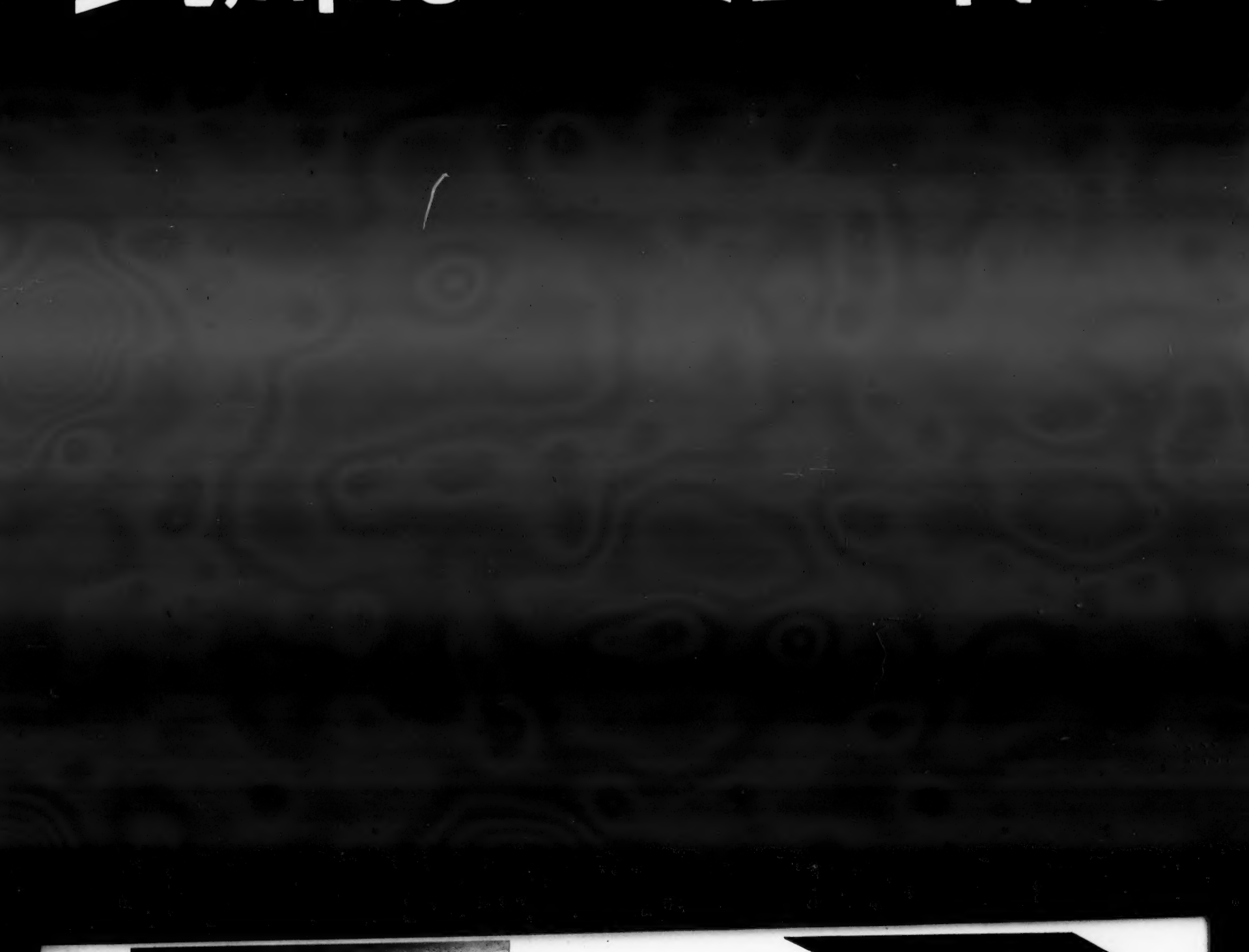

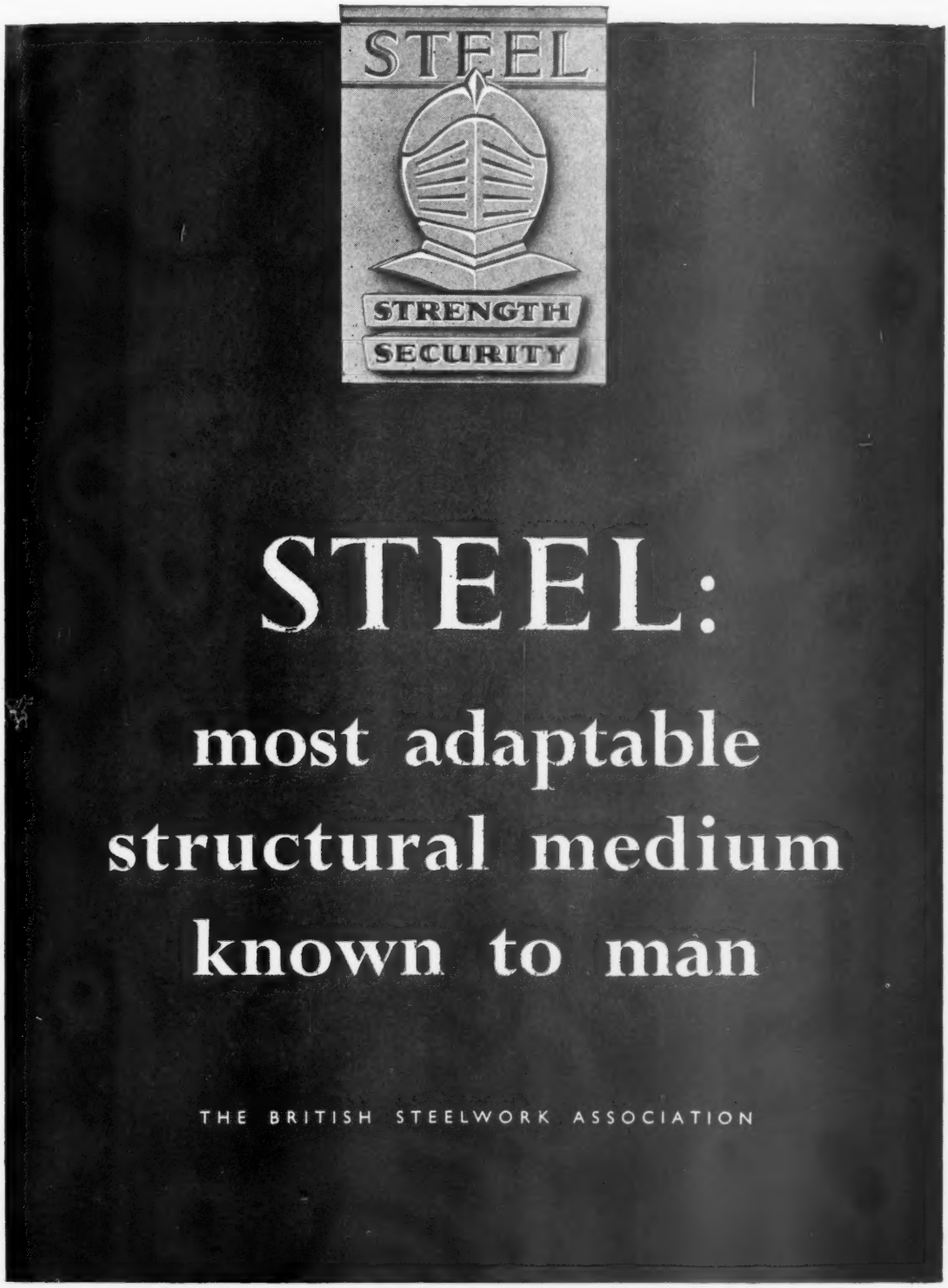
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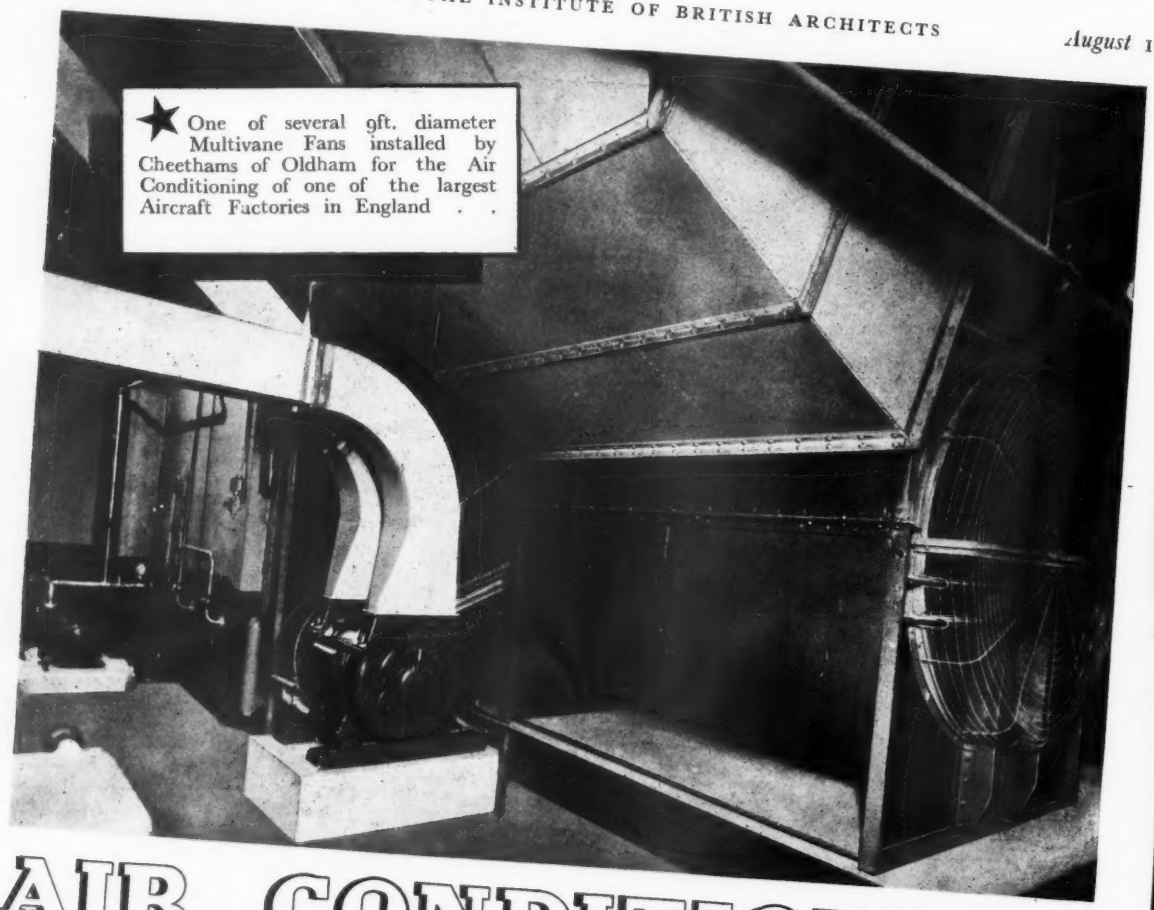

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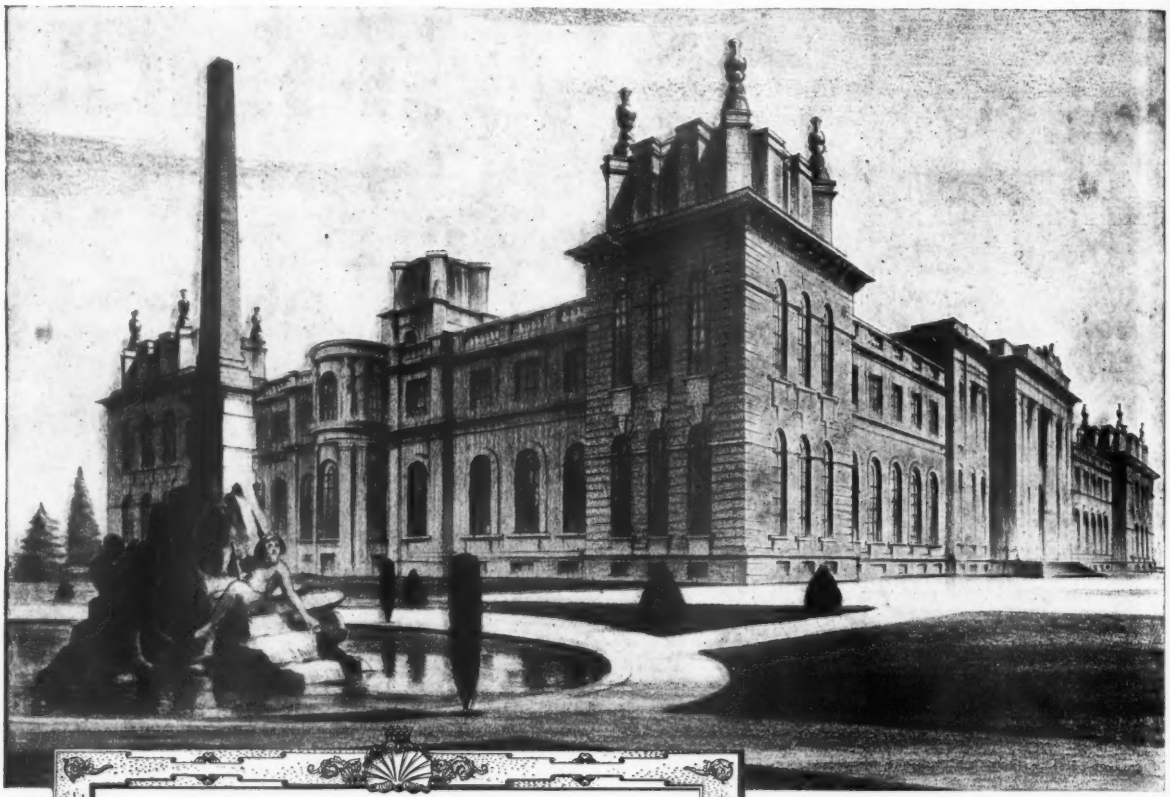

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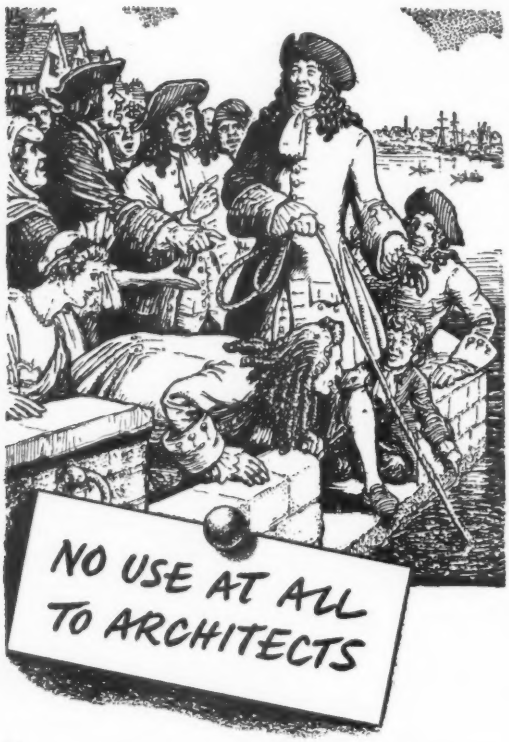

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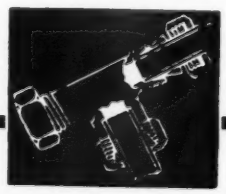

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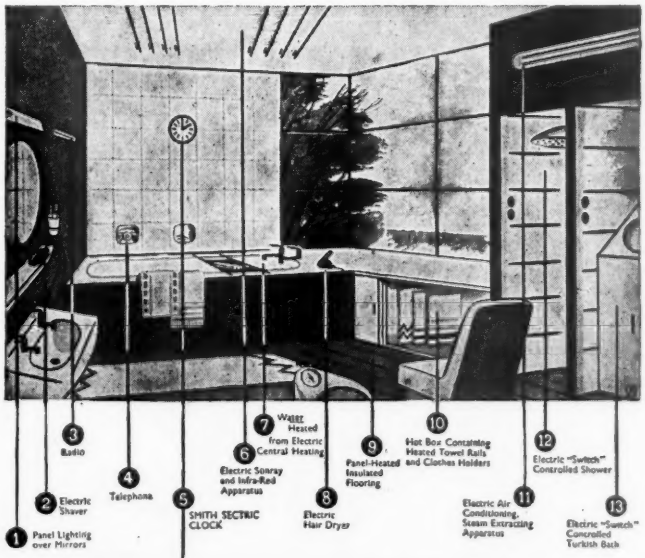
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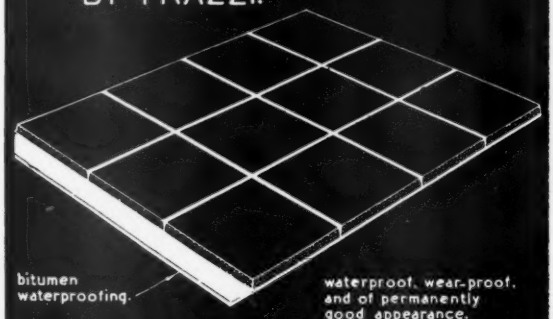

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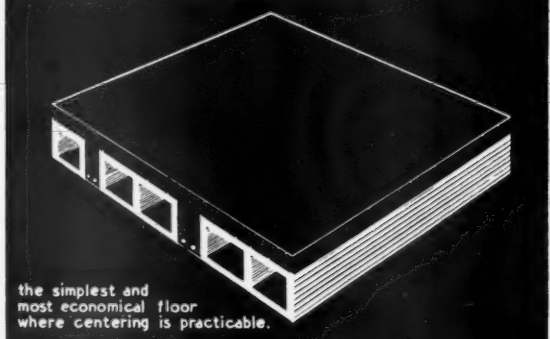

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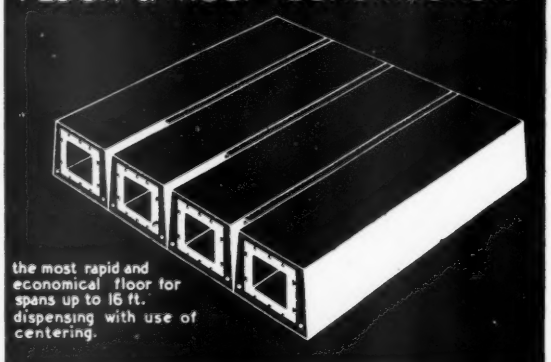

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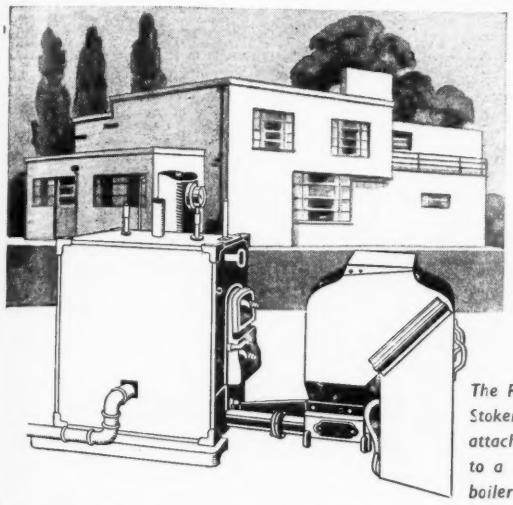

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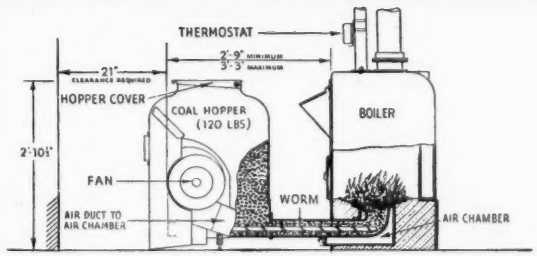

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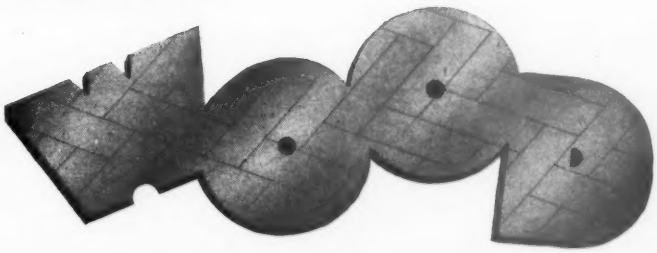

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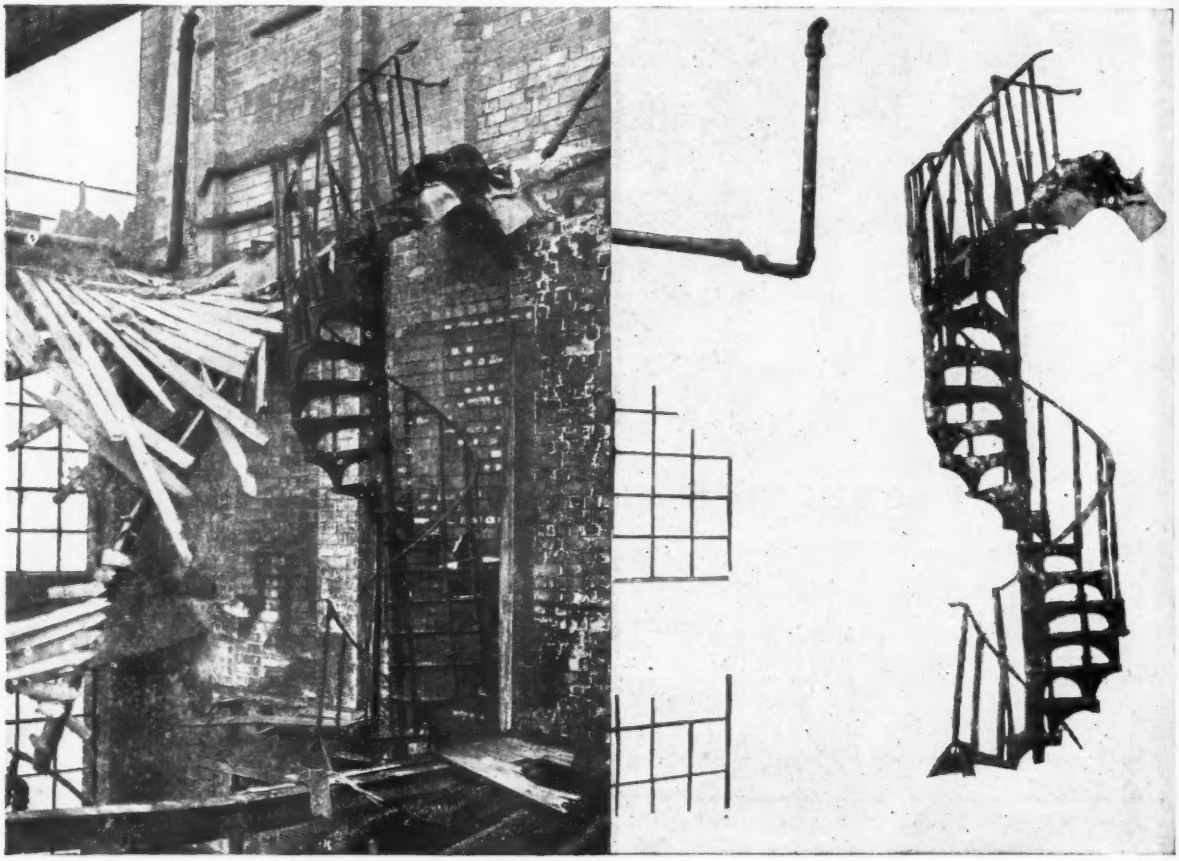

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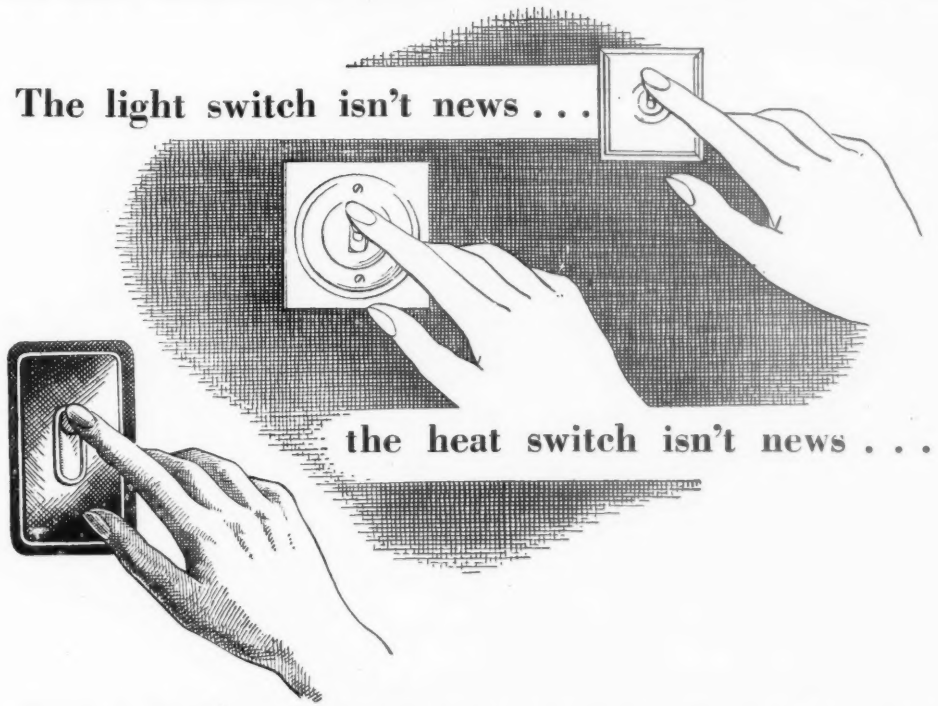

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